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PIPE LINE INDUSTRY

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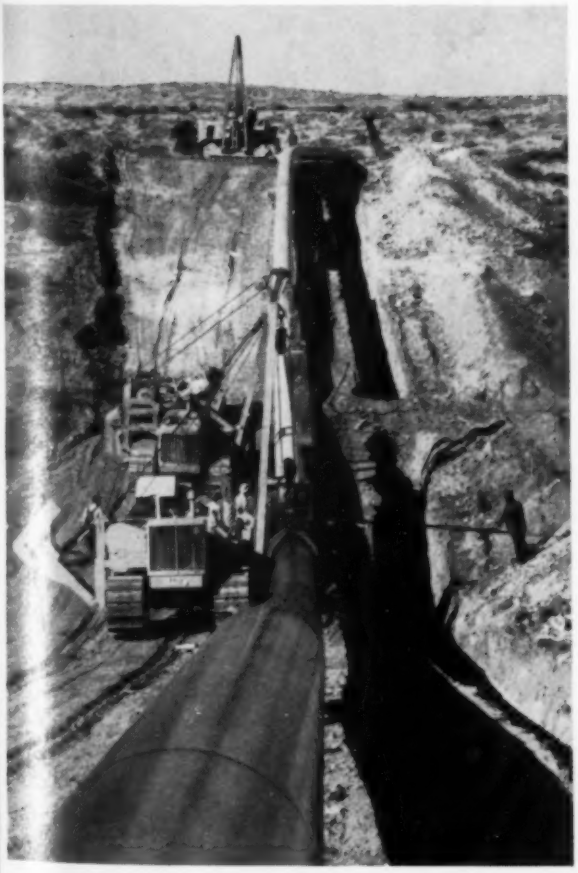

Progress West— TRANSWESTERN

WELDING X-56 FAST

Double-jointed yard innovations, plus new pipelaying ideas helped Transwestern overcome rock and weather worries Page 22

ADVANCED STATION DESIGN

Here's the latest in controls and safety instrumentation for remote unattended operation Page 30

LAYING "HOT GAS" LINE

Pacific Lighting laid "straightest line" using bell hole welding with strict specs for the line to operate at 135° F Page 39

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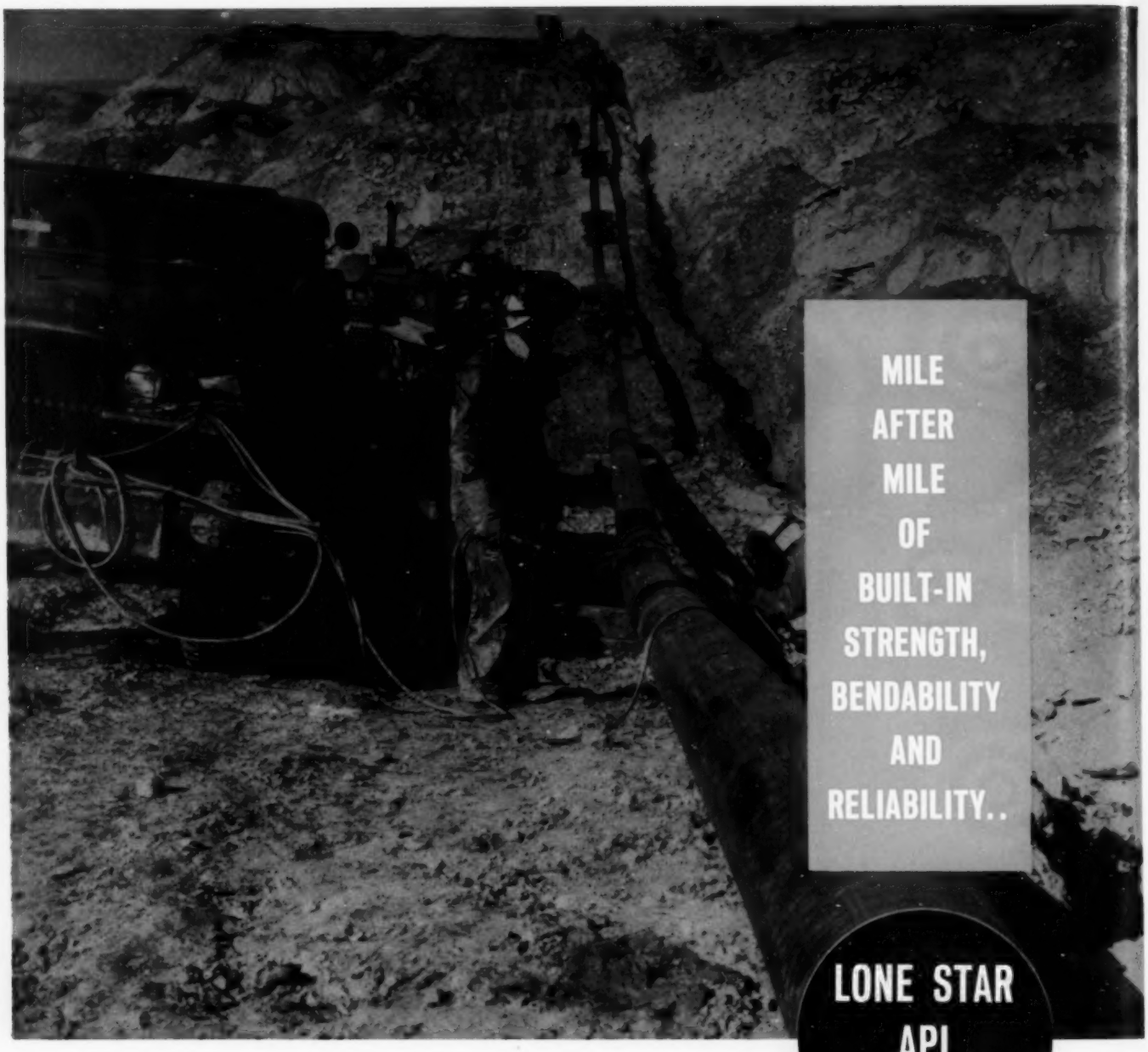

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Joe Roughneck's Pipe Mill

AUG 22 1960

PIPE LINE INDUSTRY

A GULF PUBLISHING COMPANY PUBLICATION

August 1960 | Vol. 13, No. 2

CONTENTS and Quick Look

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

Mobility Plus Sharp Ideas Sped Transwestern Work

☐ Laying the first completely X-56 pipe line system, contractors on Transwestern's 1,800-mile system used all the tricks of the trade and discovered many new ones to beat weather, terrain and time problems involved. Extensive use of double pointing, preheating pipe for field welds, special care of coating, mechanical innovations on tractors and other equipment, overhead river crossings, ripping and unusual blasting techniques were some of the major reasons for the contractor's success constructing the 22-30-inch line from Texas to California.

By Melvin A. Judah ..... Page 22

Transwestern's Stations Slick, Efficient and Pushbutton Controlled

☐ The dispatcher in the company's Roswell, N.M., control center exercises fingertip control over the entire system. Should he require any computation regarding the system, he simply feeds the information into a computer in the control center and gets an immediate solution. Thus, in a sense, the system is computer controlled. Another unusual feature about the Transwestern system is its high fuel economy. Engineers are expecting to average 6,000 Btu's per hp-hour or less for fuel gas.

By Donald M. Taylor ..... Page 30

Strict Specs Met in Bell-Hole Job on PLGS' New Line

☐ Ideal conditions existed for bell-hole construction in California's Mojave Desert and Pacific Lighting Gas Supply Company took advantage of them to lay its "hot" 34-inch gas line. Field welding in the ditch, double jointing and yard coating at railhead yards reduced pipe handling and minimized stresses. Deep cuts were made through rock and hills to meet bending limits; backfill was sifted for special care of coating. The line will tie into Transwestern Pipeline Company's new system at the Colorado River near Needles, Calif.

By Melvin A. Judah and Donald G. De Pugh ..... Page 39

'Talking Brain' Answers Phone, Reports Flow to Dispatcher

☐ This device, which has the advantage of making an audible report that is immune from scrambling during transmission, costs only $1,300 per unit and it can be installed in about two hours. The device answers the phone, gives the station number and then actuates the proper playback heads to read the numerical digits on the flowmeter. . . Page 46

REGULAR MONTHLY DEPARTMENTS

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PIPE LINE INDUSTRY published every month. Second Class postage paid at Houston, Texas.
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Test your political IQ

Do YOU WANT increased federal control with its resulting higher taxes and tighter reins on your own economic and personal life?

Growing numbers of "big government" advocates do. They believe government must do the planning for the people. PIPE LINE INDUSTRY believes in the opposite philosophy. The individual should have control over his government—should be able to make his own plans. An amalgamation of these plans, in keeping with the public welfare, should be the basis for government.

Despite arguments to the contrary, this philosophy can be kept alive. How? By informing yourself on issues affecting your economic and personal welfare—and doing something about them. Not just by voting, but by participating in politics on every level.

The first step in this direction is to check your own political IQ. The following Texas Mid-Continent Oil and Gas Association questionnaire will help you do just that. The questions are directed specifically in the area of petroleum, because you are a part of the oil and gas industry. See how you rate:

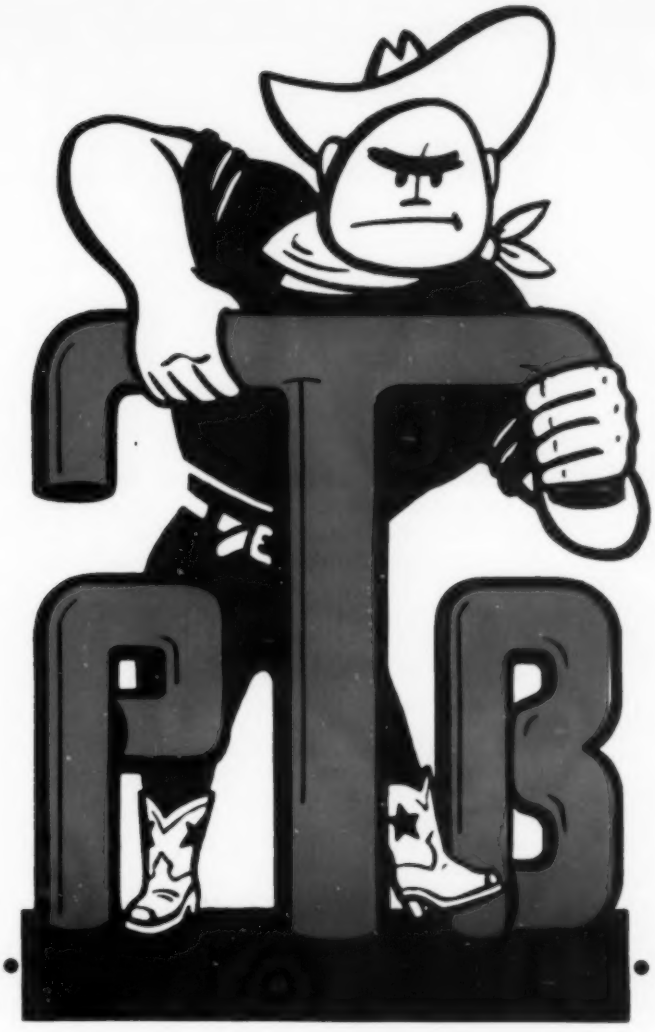
1. What county do you live in?_____ County.
2. Are you a registered voter for 1960? (Check one.) In some states this means, "Did you pay your poll tax?" Yes_____ No_____
3. Write the last name of the U.S. Congressman from your home district. _____
4. Write the names of three representatives in your state legislature.
   1. _____
   2. _____
   3. _____
5. What is the total state and federal tax per gallon of gasoline in your state?_____
6. What is the rate of state severance tax on production of crude oil in your state?_____
7. Have you written a personal letter to a member of Congress in the last year on
   1. Fuels policy resolution? _____Yes _____No
   2. Percentage depletion? _____Yes _____No
   3. Gasoline taxation? _____Yes _____No
   4. Natural gas regulation? _____Yes _____No
   5. Labor legislation? _____Yes _____No
   6. Any other subject? _____Yes _____No
8. Have you written a letter to a member of your state legislature about an oil or gas industry issue within the past year? _____Yes _____No
9. Do you belong to a civic club (such as Rotary, Lions, etc.)? _____Yes _____No
10. In Presidential elections, do you usually regard yourself as a_____Democrat, _____Republican, or_____Independent. (Check one.)
11. Have you ever worked as a campaign volunteer in behalf of any political party or candidate? _____Yes _____No
12. What kind of a job do you feel your employer does in keeping you informed on oil and gas industry affairs? _____Good _____Poor _____Fair
13. Generally, what attitude do you think the following persons have toward the oil and gas industry? (Check one.)

	Friendly	Unfriendly	Don't Know
Chet Huntley			
William Proxmire			
Lyndon Johnson			
Dwight Eisenhower			
David Brinkley			
Jerome K. Kuykendall			
Frank M. Porter			
Paul Douglas			
Drew Pearson			
Matthew V. Carson, Jr.			
Richard Nixon			
Douglas Edwards			
M. J. Rathbone			
Oren Harris			
Ralph Yarborough			

14. Who would you say is the best known oil man in your city? _____
15. Have you made a speech before any sort of public gathering concerning the oil and gas industry within the past two years? _____Yes _____No
16. Do you recall reading or hearing of anyone in your company making a speech on an oil and gas industry subject during the past year? _____Yes _____No
    If "yes," who was the speaker?_____

According to Texas Mid-Continent, scores on the test were surprisingly low. If your rating falls into this category, particularly where major issues and voting records of potential candidates are concerned, take your July issue of PIPE LINE INDUSTRY off the shelf and read the report, "Why the Pipe Line Industry Should Take An Active Part in 1960 Political Campaigns," starting on Page 32.

Then get off your apathy and take an active part in politics during this presidential election year.



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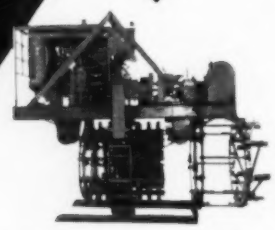

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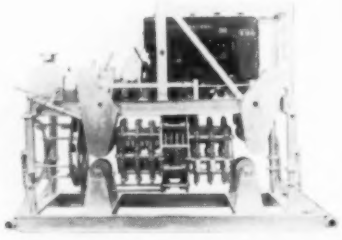
Seam welds are cleaned thoroughly on both sides.

This fast, dependable unit is powered by an International U-9 self-starting engine using the Ramsey transmission. Engine exhaust is utilized to heat primer tank. Sizes: 3" through 36".



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Advertising rates on application.

SUBSCRIPTIONS

R. B. Reilly, Circulation Manager, P O Box 2608, Houston 1, Texas, U.S.A. Single copies 50 cents. Double price for single copies more than a year old. Subscription rates: both foreign and domestic $2 a year, $3 for 2 years, $4 for 3 years. Copyright 1960 by Gulf Publishing Company.

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Indexed by Engineering Index

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The Condition of this Obligation is such that Whereas Seller has sold to Buyer the below-described parts assembly or assemblies originally manufactured by Caterpillar Tractor Co. and reconditioned in accordance with practices recommended by Caterpillar Tractor Co.:

DESCRIPTION	PART NUMBER	SERIAL NUMBER	SALE PRICE

And Whereas Seller guarantees each said parts assembly against unsatisfactory performance due to defective material or workmanship for _____ days after the date of sale shown below (herein referred to as the guarantee period), the obligation under this guarantee being only to repair or replace, as Seller may elect, any said assembly which proves defective in material or workmanship under conditions of normal use during the guarantee period at Seller's expense (including cost of all necessary materials and labor) up to a maximum of the lesser of Five Thousand Dollars ($5,000.00) or Seller's price, with respect to each said assembly, except that the cost, if any, of transporting each said assembly from and to Seller's place of business shall be paid by the Buyer.

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THE ABOVE GUARANTEE IS VOID, AND SELLER SHALL BE UNDER NO OBLIGATION THEREUNDER, IF CLAIM IS NOT MADE TO THE SELLER WITHIN THREE (3) DAYS AFTER DISCOVERY OF THE DEFECT UPON WHICH THE CLAIM IS BASED.

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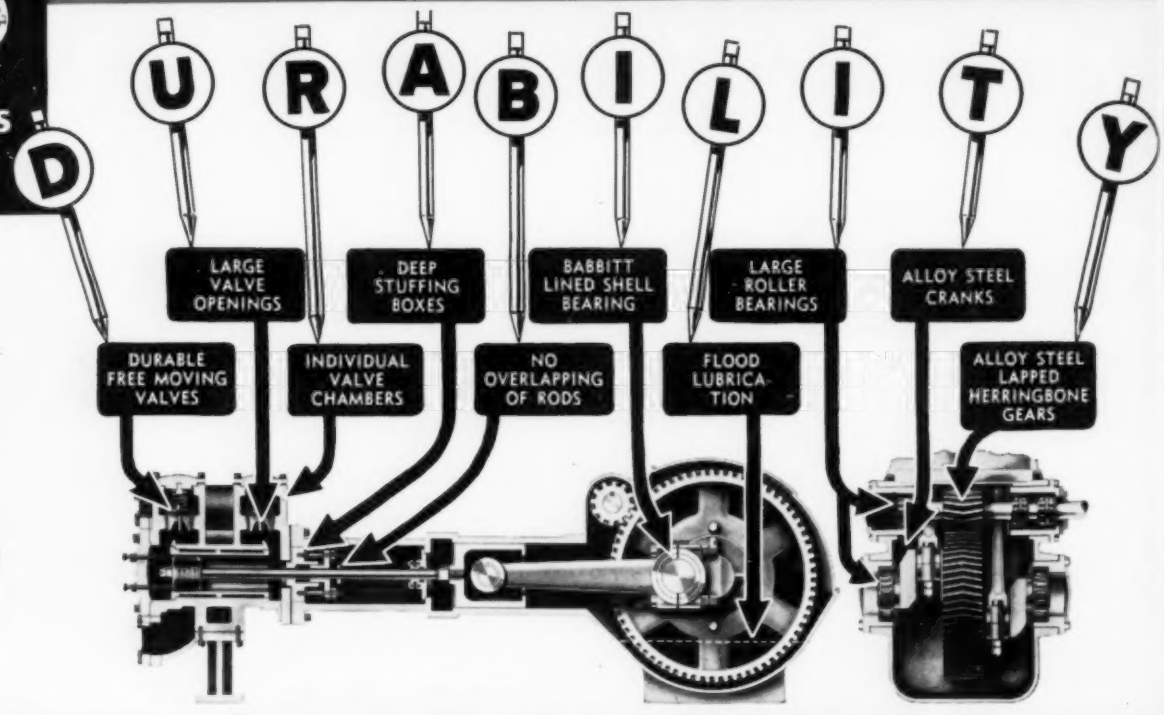
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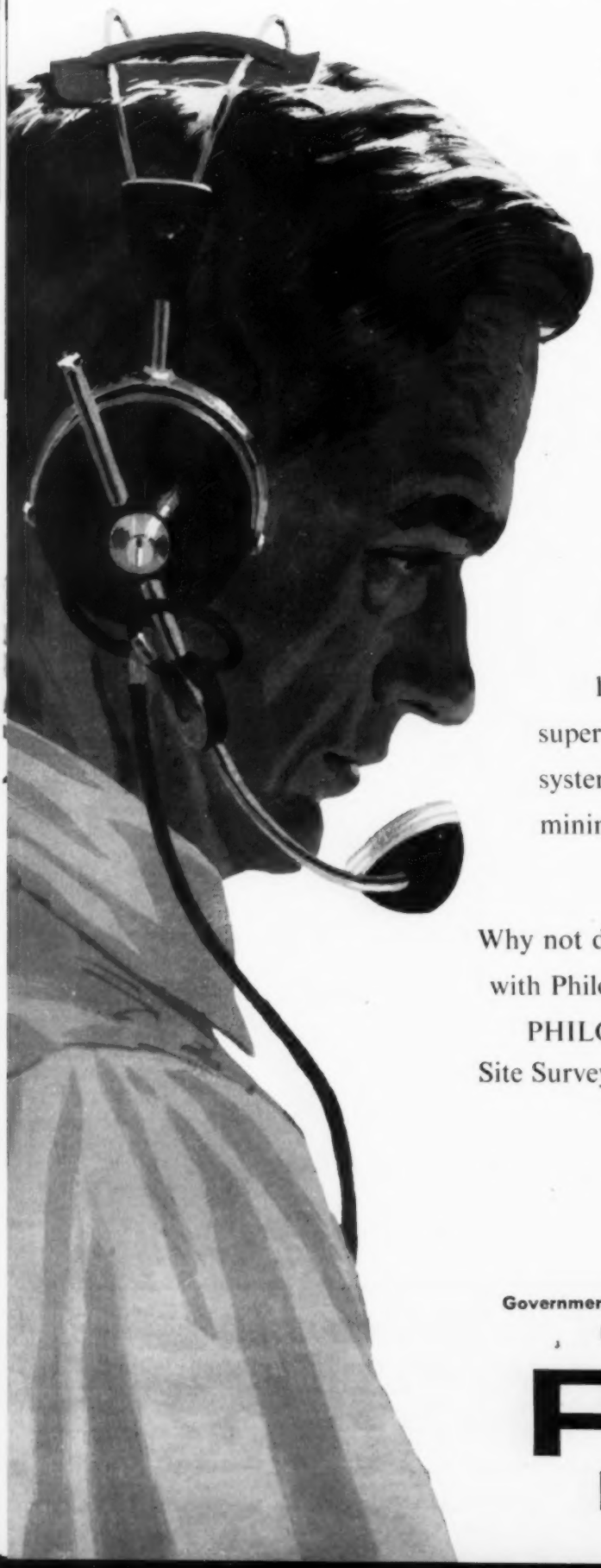

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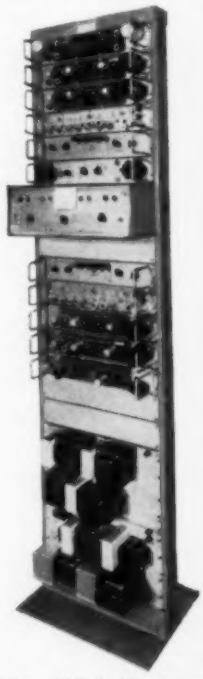

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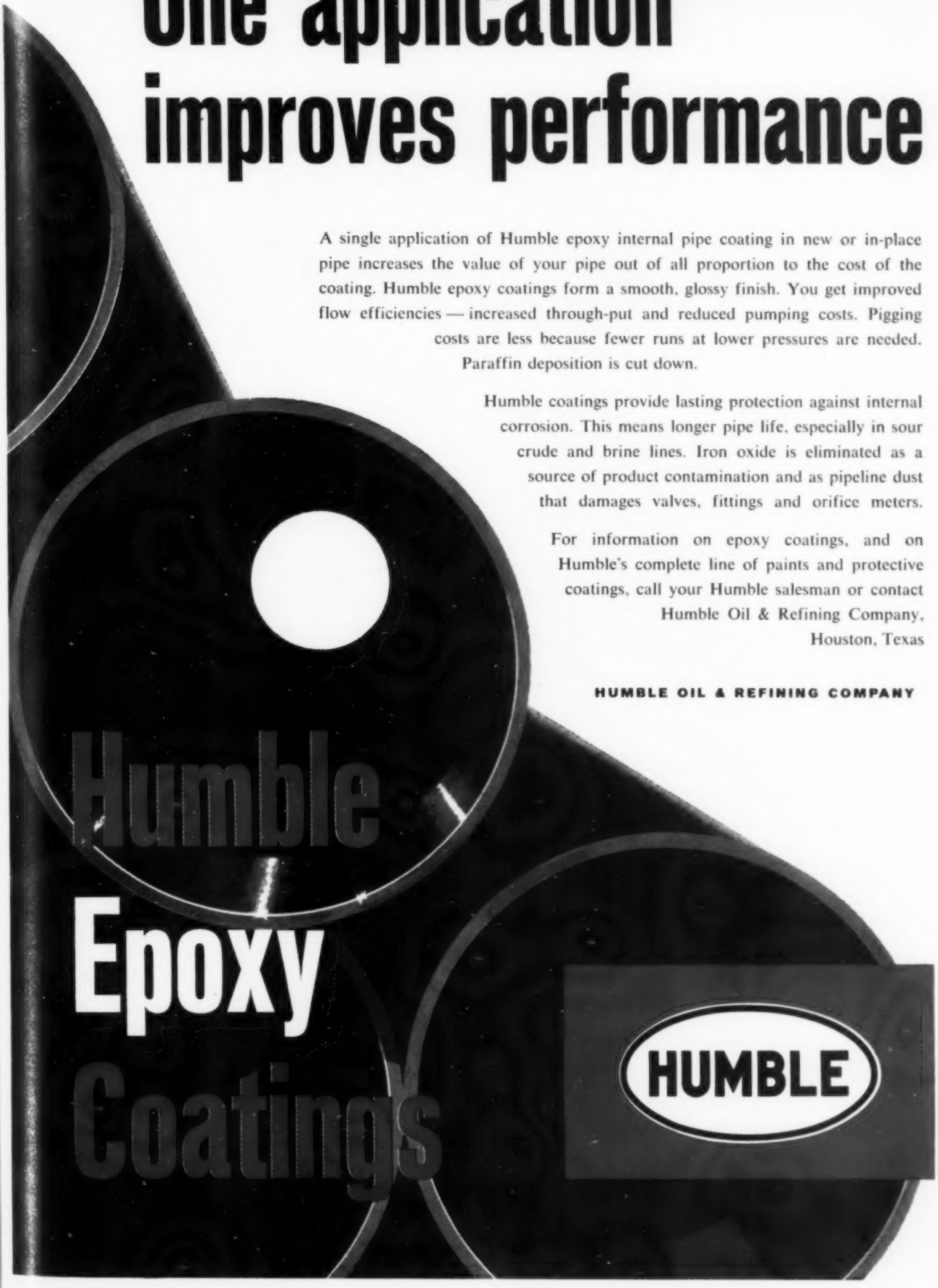

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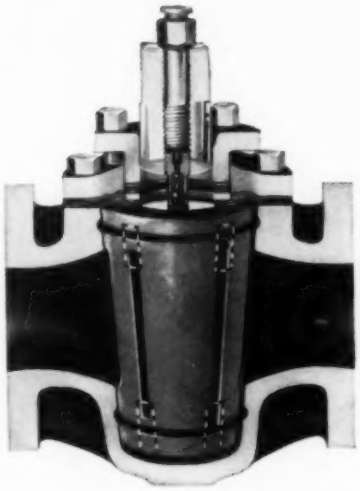
the application:



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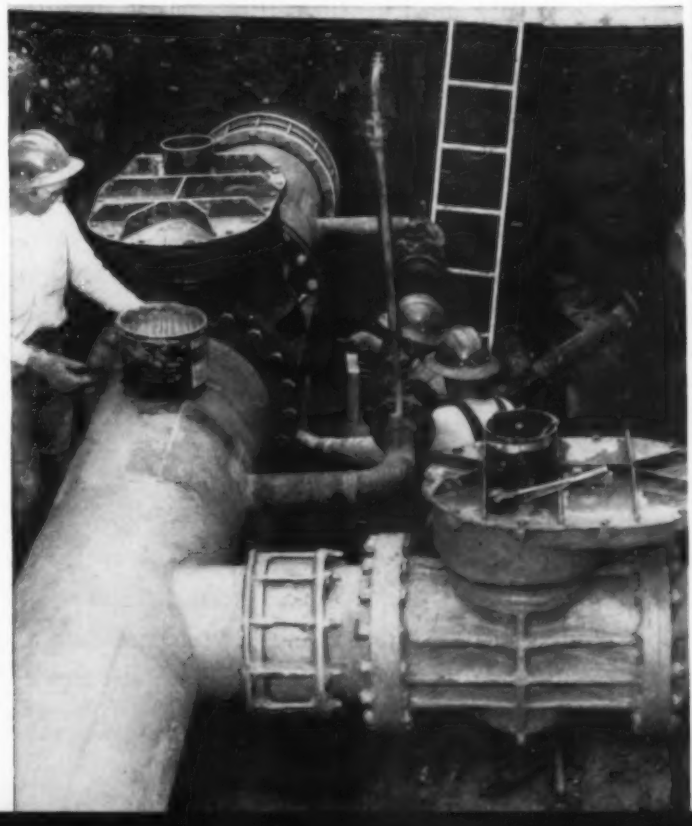

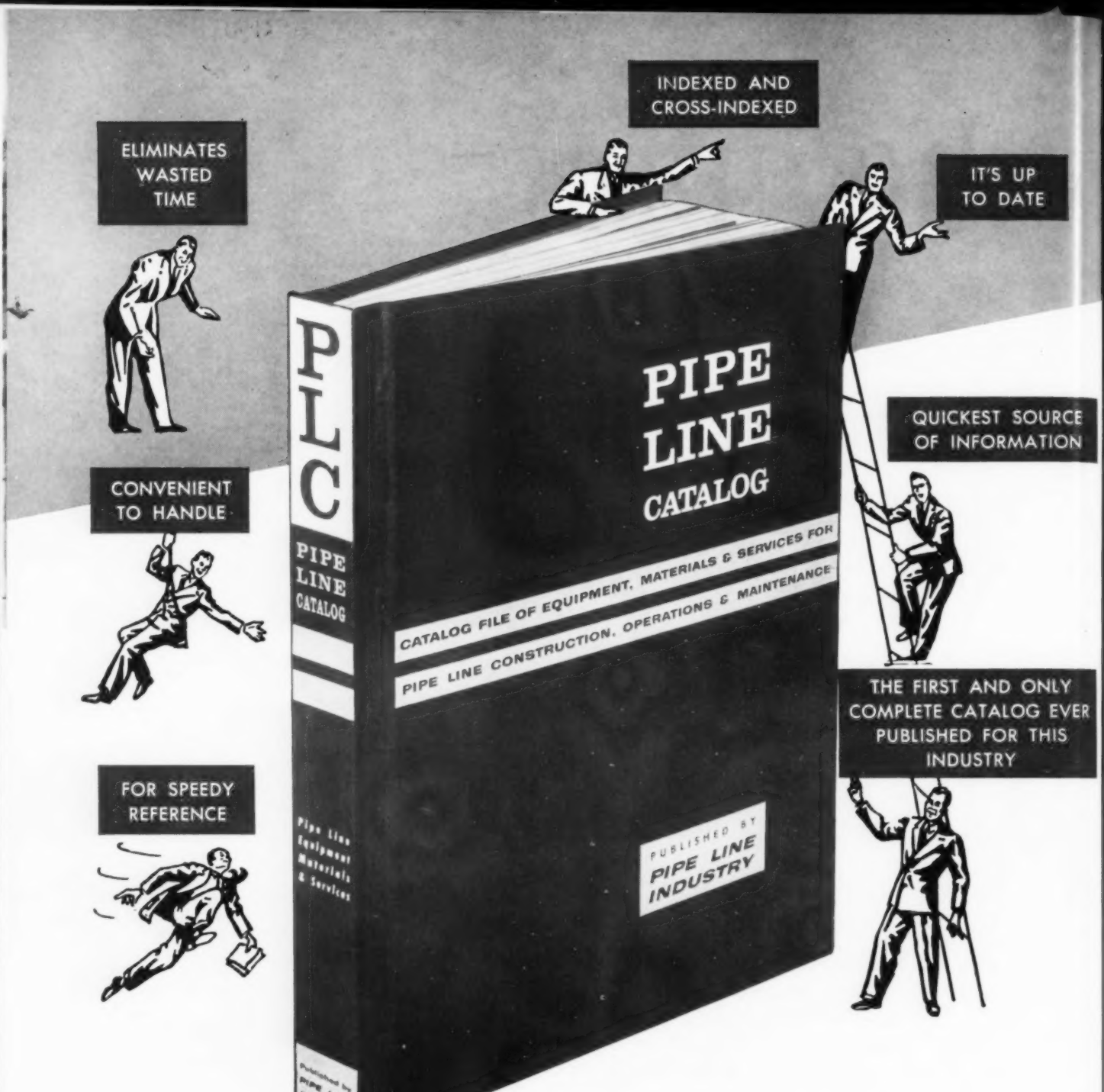
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CONVENIENT TO HANDLE
THE FIRST AND ONLY COMPLETE CATALOG EVER PUBLISHED FOR THIS INDUSTRY
FOR SPEEDY REFERENCE
PUBLISHED BY PIPE LINE INDUSTRY

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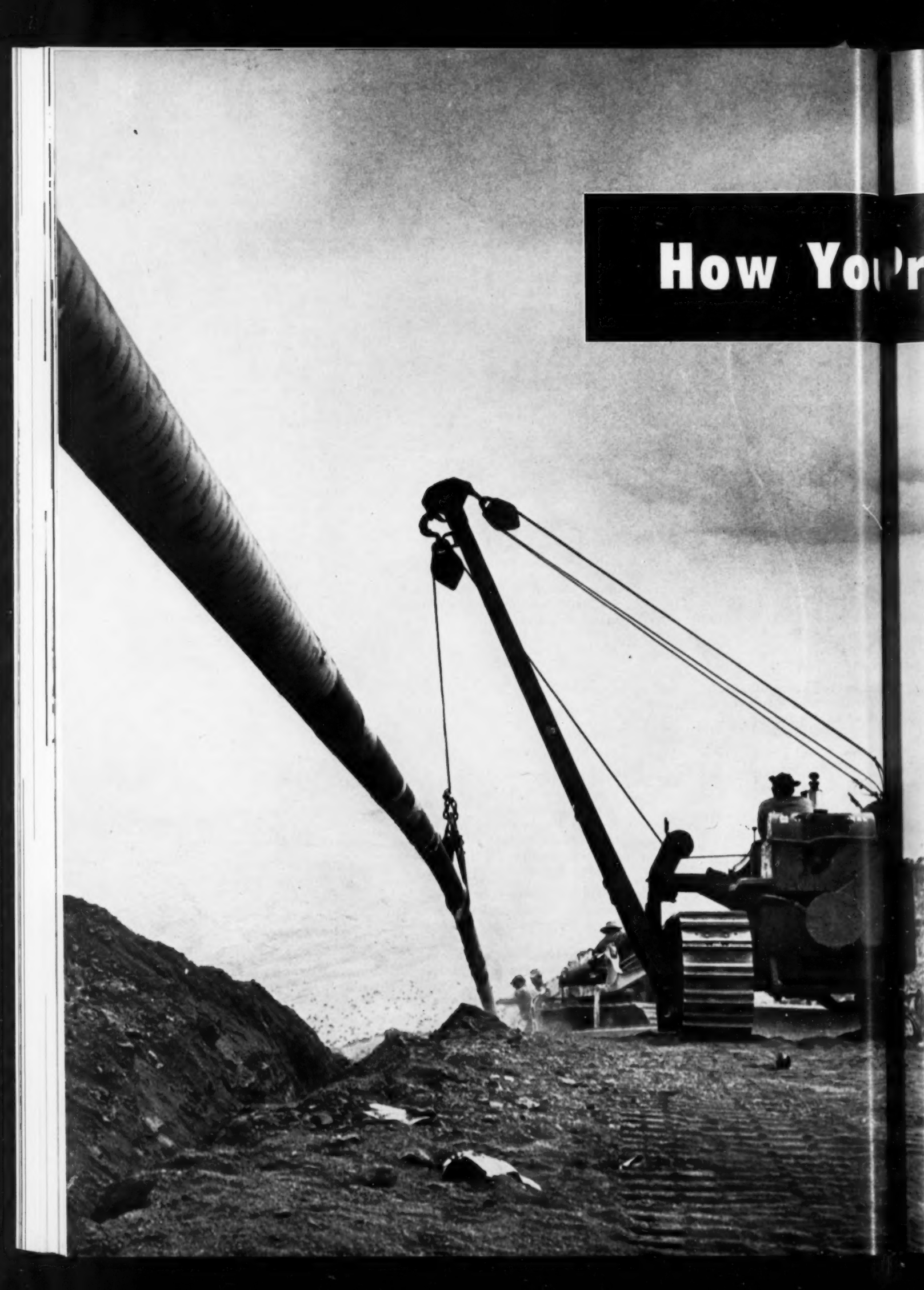
PIPE LINE CATALOG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PIPE LINE PANORAMA

Construction Outlook: Bright and Getting Brighter . . . Contracts let on major projects during the past two months indicate this year may prove up to expectations. Construction is now under way on more than 6,000 miles; this brings total being built or completed in 1960 to about 12,000 miles.

On domestic scene, FPC examiner has approved Colorado Interstate and El Paso Natural gas proposal to build $150 million, 1,025-mile project to move gas to California-Nevada border from Rocky Mountain area. Also, Tennessee Gas Pipe Line and Petroleos Mexicanos are negotiating plans for 1,240 mile, 34-inch line from Reynosa to Mexico-California border. Texas and Mexican gas would go to Los Angeles area through the $160 million system. **A major gas line is proposed in Argentina by YPF.** Plans call for turn-key job with American or European company which would handle financing, design and construction methods for line from Comodor Rivadavia to Buenos Aires. Texas Eastern and Italy's ENI have been invited to submit proposals. Bidding deadline: November 4 (See Page 52).

Rubber Tanks for Offshore Crude Storage . . . At least one oil company is keeping close watch on U.S. Navy's test of underwater containers off Louisiana coast. (See Page 48). Initial test is in 52 feet of water, using 1,250-barrel tank. If test succeeds, Navy plans to build 25,000-barrel tanks to store fuel on Gulf floor for emergencies.

Estimates are that companies desiring to store offshore crude production could install tanks for less than $25 per barrel in reasonable depths. Special devices are being used to anchor rubber tanks to Gulf floor, stop inflow when tank is full, and measure volume of crude being stored in tanks.

Russia Building World's Longest Crude Line? . . . Acute shortage of line pipe and equipment has slowed Russia's ambitious plan to build 2,795-mile crude line from Volga oil fields in Second Baku area to Hungary, Czechoslovakia, Poland, and East Germany. East German branch of line will be near Baltic seaports, making Second Baku crude more available to Scandinavian and other Western nations.

Line, ranging from 20.6-24.6 inches in diameter, is expected to deliver 290,000 barrels of crude daily by 1965. Russians report line will have station every 62 miles, pumping about 58 barrels of crude per minute.

Pipe Line Briefs . . . Political pressures exerted by coal and other special interest groups emphasize urgent need for every phase of oil and gas industry to form united front on critical issues, become more active on Washington scene . . . **Predictions are that natural gas bill,** national fuels policy, depletion, imports control, and tax rulings will make next session of Congress one of the most important in oil industry history . . . **Federal Power Commission reports** operating revenues of interstate natural gas pipe lines totaled $274.2 million in May, up 19.6 percent from May 1959 . . . **Final agreements on 1960 labor rates in 40 states show** average increase of 10.1 cents per hour or 5.1 percent over 1959 rates . . . **FPC has ruled** that Southern Natural Gas Company can increase rate of return from 6 percent to 6.5 percent; company had asked for 7 percent . . . **Interior Secretary Seaton says** Department will act quickly to set up Office of Coal Research to increase use and output of coal (As per Coal Research Act signed by President Eisenhower on July 7). **Question: How many oil and gas industry tax dollars will be used to revive its stiffest competitor? . . . In 5-4 decision on Sunray Mid-Continent and Sun Oil cases,** U.S. Supreme Court ruled that once a producer starts selling gas to an interstate pipe line, he can not terminate contract, or even file for new contract rates after expiration.

Transwestern Pipeline Company's 1,800-mile system crossed several hundred miles of rock, limestone, caliche and lava beds which were rough on construction equipment. Here Houston Contracting knocks down a 700-foot cliff near Mountainair, N.M. This Houston spread encountered 18 to 20 percent rock which required some blasting.

Mobility Plus Sharp Ideas Speed Transwestern Work

By double-jointing X-56 pipe, solving rock and winter weather problems and thinking up a bundle of important welding and pipelaying advances, contractors completed line ahead of schedule

By Melvin A. Judah
Editor, PIPE LINE INDUSTRY

JUST ABOUT any story written about pipe line construction work centers on weather, rock, welding, and new ideas or short-cuts developed by contractors or engineers. Transwestern Pipeline Company's new system is no exception; from these came progress during construction of this 1,800-mile gas pipe line system from Texas to California.

Weather worries included some of the "worst" blizzards ever to hit the Southern Rocky Mountains, unseasonally heavy rains made the Texas Panhandle look more like South Louisiana, and for good measure some wind, dust and shifting sand storms were encountered in West Texas and New Mexico. Contractors had to come up with inventions to meet nature's worst. Rock problems weren't a surprise to the Gulf Interstate Company engineers and the contractors, but there were some innovations here that paid off, too.

The chief problem in welding was making good welds on the high yield API 5LX-Grade 56 pipe; Transwestern's is the first system to use it throughout for main line. But early in the job, welders and inspectors had worked out practices to a point that X-ray inspection showed them near perfect; one spread boss reported no underbead cracking in the first 32 miles laid. Double-jointed pipe was used extensively on the project; 40-foot joints were doubled into 80-footers at four railhead yards; contractors also laid 60-foot mill jointed pipe on New Mexico sections. Other improved ideas came in pipe and coating protection, in blasting, and in river crossing techniques.

Welding the X-56 Pipe. The pipe used on Transwestern's 30 and 24-inch lines had a minimum yield strength of 56,000 psi and ultimate strength of 74,000 psi. Its high carbon and manganese content place new limits on its weldability and cold working tolerances are tight. With the exception of preheating as a normal field practice ordinary welding methods were used, but close attention was paid to specification limits.

LPG-fueled burners were used to preheat pipe ends ahead of the pipe gangs; for example on L. A. Young's Houston spread pipe was heated up to about 320° F. Chill was taken out of the pipe back about 2½ feet from the end. Preheating was normally done about 2-3 joints ahead of the pipe gang so pipe was down to about 300° F or less at line-up. Minimum pipe wall temperature for most spreads was about 150° F when the stringer bead was run.

Specs called for a minimum of 65 weld X-rays per day on field welds; a good day's progress was approximately 150 welds and since 100 percent of the double-joint welds were X-rayed the net X-ray inspection on main line was 60 to 70 percent. Inspection and testing to this degree proved out the very high quality of girth welds throughout the main line X-56 pipe. Gulf Interstate Company had the responsibility for design, engineering and construction supervision on the Transwestern system.

How Double Jointing Cuts Costs. Both H. C. Price Company and Houston Contracting made extensive use of double jointing on their spreads in New Mexico and Arizona. All of the pipe that Price laid across Northern Arizona was double-jointed at railhead yards into 80-foot lengths. Houston also laid some 60-foot double-joints from the mill and mixed in 40-foot joints in rugged country for flexibility in line-up. R. H. Fulton and Company's spread in Western New Mexico was the only main line spread that did not use double-jointed pipe.

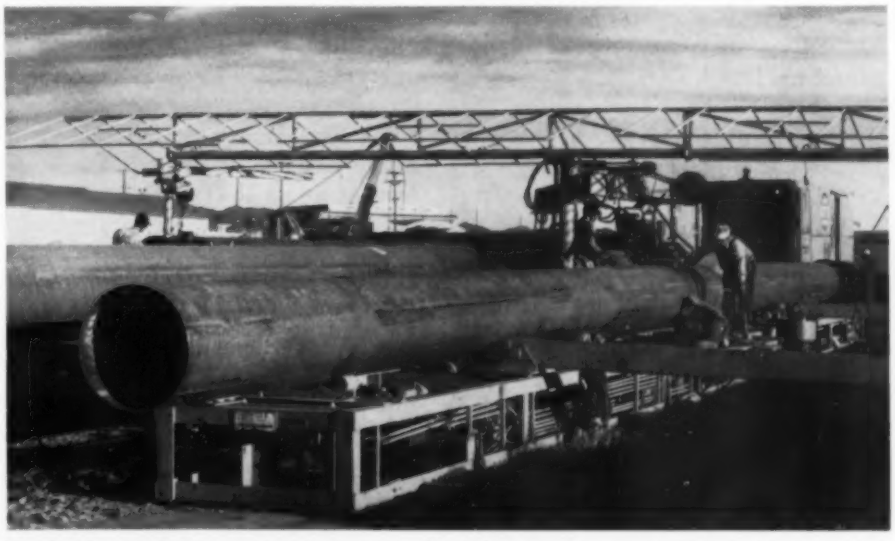
Three Semi-automatic Passes. Operation of the Price yard at Kingman, Arizona was representative of double jointing techniques on Transwestern. An outside bead was run at 800 amps, 33 volts, at a rate of about 108 inches per minute; a second outside weld was then made at 750 amps, 34 volts at about 55 inches per minute. An internal weld was then completed by a welder controlling arc from a boom using a setting of 725 amps, 34 volts at 55 inches per minute. Double jointing operations continued through the winter.

Price spreads which have pioneered in perfecting double-jointing techniques on other work during the past two years, proved out several advantages for this method in rugged Arizona work. First, although only half as many field welds are necessary, obviously progress isn't twice as fast. Experience has shown that optimum gains are more likely about 30 percent over laying 40-foot joints. And there are other advantages found, even in mountains, besides better quality-controlled welds and speed;

Helicopter provided quick access to any spot on H. C. Price's Arizona spread. Here helicopter lands within a few yards of pipe line in rugged country. Choppers were used chiefly by spread superintendents to make quick hops along right of way and maintain better control on their spreads.

For welding the high strength X-56 pipe, contractors preheated joint ends ahead of stringer bead. Here Houston Contracting uses three-burner propane heater to heat pipe to about 320° F, taking chill out of pipe about 2½ feet back from weld.

Operator knocked off slag as pipe is double jointed with semi-automatic unit in Houston's Roswell, N. M., yard. Controls for positioning pipe during line-up are placed on the arm at left. This gave welding operator closer control over entire line-up and welding procedure.



Much of the 30-inch main line was double-jointed at four railroad yards. At Price's yard set up in Kingman, Ariz., pipe is rotated while automatic submerged arc welding machine makes external pass to join two 40-foot joints. Vertical, horizontal and rotary pipe positioning was controlled through pushbutton panel at end of rack. Two external passes were followed by an internal stringer bead to complete weld.

Price came up with more than new pipelining ideas while laying 350 miles across Arizona. Al Olsen, Arizona Museum of Natural History, at right, finds precious archeological prizes along right of way. Skeleton uncovered above dates back to about 1100 AD. Supt. Abe Reutzel (left) and Phil Davidson, Leland Equipment Co., were present at discovery site. The photo at right shows how extended "stinger" on sidebooms facilitated handling twin air drills in rugged country on Houston Contracting's New Mexico spread. Air-powered drills were driven by 600-cfm air compressor.

bending was often speeded because of fewer joints that had to be carried to the bending machine. Often three small bends were made on an 80-foot joint where only two would have been possible with 40-foot joints.

In spite of winter weather hazards Price's Arizona spreads reported several good days when progress was between 9,000 and 11,000 feet per day.

Yard "Inventions" Speed Welding. Double jointing yards at railhead are not new, but modifications are being made to them regularly so techniques are still being "invented." One of the biggest problems has been that of getting pipe to and away from the semi-automatic welding stations. Sidebooms have been used generally, but they have their limitations in speed and handling; at one yard the superintendent was just before shutting down on one windy day, not because welding was blown out but because the sideboom operator could not see where pipe, rack, and men were.

Dust is a problem but even without it pipe movement is often critical. H. C. Price at its western Arizona yard "beefed up" the sideboom and added an extra sling so that it could pick up and carry two joints at once.

At Houston's Roswell yard, controls for the pipe leveling and rolling machinery had been shifted to the welding station and mounted on a movable arm so that line-up could be quickly and accurately controlled. Motor controls for the dolly that stowed the internal line-up clamp when it was pulled out of the pipe were also shifted to end of the rack so that work could be more precisely controlled without electric motors being kicked out repeatedly when the dolly hit the limit switches. For extra safety, switch cut-outs were placed in the circuit controlling pipe on the internal pass rack so pipe could not possibly be kicked out while a welder was inside on the boom.

Speeding Ditching. A major portion of the ditch on several spreads was ripped to as great a depth as practical. Transwestern crossed just about every type of terrain; shale, limestone, granite, lava flows, caliche, shifting sands, open prairie and even a stretch of marsh along the Pecos river near Roswell.

In crossing New Mexico, Houston's spreads encountered rock that required some blasting on about 18-20 percent of the ROW. Here they used 40 to 60 percent dynamite set off with a millisecond delay by primacord. Blasts tended to work against one another; shattering forces carrying first to one side of the ditch and then back giving better break up and less throw of rock. In a typical shot, 497 holes were loaded with 10 sticks of 40 percent dynamite in each to shoot about 1,000 feet of ditch. Larger shots ran up to about 3,000 pounds of dynamite. Some of the Price spreads used granulated Compound B set off with sticks of dynamite in some areas. For much of the rock work that required blasting costs often ran as high as $3-$4 per foot of ditch.

A variety of rock drills was used on the Transwestern work; Price spreads used quad-drills, a single track powered unit, and tested out a new self propelled single rotary drill in Western Arizona. On New Mexico spreads, Houston used twin trench units supplied with 600 cfm portable diesel engine driven compressors. What was probably the greatest cut made on the line was near Mountainair, New Mexico where L. A. Young's spread "moved a mountain" to lay the pipe down a 700-foot bluff.

Boosting Ditcher Power. To increase the power actually cutting the

Dolly catches line-up clamp after external pass was completed at Roswell double jointing yard. Switch at left gives operator control over movement of the dolly to position it for inserting and retrieving line-up clamp. Handy switch location prevents dolly from banging into joint and kicking out electric motor.

ditch, Houston Contracting kept a tow tractor ahead of the ditchers even in level country. With a tight tow line essentially all of the engine power of the ditcher went into the wheel. It paid off in two ways on the New Mexico work—lowering maintenance on the ditching machine and decreasing down time. Both were important benefits when working in a remote area and with a great length of ditch to cut, often under severe weather conditions.

Special care had to be taken to ditch in the shifting sands crossed by Western Pipe Line, Inc. in construction of the West Texas 24-inch lateral. Pipe was welded ahead of ditching in about 3,000 foot sections. Ditch was then dug and pipe was lowered in and backfilled immediately. C. P. (Chuck) Siewert, general superintendent for Western, was in charge of this spread. In sand dune country ditch was cut deeper than normal to prevent the pipe line from being uncovered during future wind storms.

When spring winds started blowing in this country, contractors had an extra job, that of emptying sand out of the joints of pipe strung along the ROW. A joint was picked up and blown out by a nozzle welded onto a nightcap and supplied by a 315-cfm air compressor.

More Power for Pipe Gang. Houston Contracting's pipe gangs made good use of their shop-modified, tractor mounted welding machines. Two dual 300-ampere, 40-volt welding machines supply four 300-amp leads for stringer bead welders. Welder machines were driven by the 105 horsepower tractor engine which was equipped with a 2 percent speed control governor to provide precise current control. A constant output was thus supplied; each welder loads about 20 horsepower onto the engine during actual welding with a 40 hp load when a dead short is struck.

To supply air for the pneumatic internal line-up clamp, a 2-cfm air compressor was V-belt driven off the right side welding unit. Spreads reported particularly good results with the new roller faced, pneumatic line-up clamps used; they improved line-up and rolling out of high-lows and flats with a minimum of hammering on the high strength X-56 pipe.

Price Quad-Mounted Welders Speed Firing Line. Like the Army (or the Navy) speed and mobility in cross country pipe laying is the key to

This typical blasting shot near Corona, N. M., had 497 holes in about 1,000 feet with 10 sticks of 40 percent dynamite in each. Blasting was timed with millisecond delay to accomplish maximum shattering and minimum rock throw.

Top power was supplied to ditcher wheel by tractors towing wheel trenchers. Using taut tow line, maximum ditching engine power went into the wheel; this sped trenching rate and reduced maintenance on ditchers.

Incorporating a 2 percent speed control governor, Houston Contracting got finer control over its 105-hp tractors which were modified to drive welding machines on pipe gang. With this governor, there was no trouble in making a constant speed and output for the welding machines. The 300-amp, 40-volt welding machines supply four 300-ampere leads. Line-up tractor was equipped with a 2-cfm air compressor driven by V-belt off the right side welding unit with an air tank mounted alongside.

Welding 60-foot mill double-jointed pipe, Houston's spread near Corona made good use of wind shelters. These canvas stand-up wind breakers enabled firing gang to work in winds up to 15 to 18 miles per hour. The collapsible shields were stacked on flat bed trailer for quick delivery to next weld.

success. On the Price spreads four, or in some instances six, 300-amp welding machines were mounted on tractors to speed firing line welding. This equipment, first used on previous work, paid off extremely well where both terrain and weather demanded maximum progress when possible.

On New Mexico spreads, Houston Contracting made good use of canvas-steel frame wind breakers which enabled firing line welders to continue working in winds up to 15-18 miles per hour. Folding frames facilitated leapfrogging the breakers along the line with a flat bed rubber tired wagon and tractor. All equipment on Houston's spreads was diesel powered to simplify fueling. Daily progress of 5,000 to 6,000 feet in New Mexico work was considered a reasonably good rate because of wind and other winter hazards.

Weather Worries. In New Mexico work, contractors encountered some of the heaviest snowfalls in recent history; over 36-inches came in one blizzard. A total fall during a continuing series of storms was over 50 inches. Drifts across highways, roads, and right-of-way access were up to 12 feet deep and temperatures dropped to four below zero. It was not unusual for two to three weeks to be lost at one stretch.

At the height of winter work, contractors took special means to defrost and dry pipe ahead of priming and coating. Extra care was given to preheating of ends of joints. Snow was removed from open ditch by clam shell, by a small dozer, and in one case unsuccessful efforts were tried at blasting it out.

Although not as severe probably, the effects of weather in the Texas Panhandle were more difficult. During work on 105 miles of the 24-inch lateral line, R. H. Fulton and Company faced extra heavy rains and flooding conditions that made the right-of-way appear more like South Texas. Ditches filled with water, fields were flooded and field work had to be shut down.

Sheehan Pipe Line Construction Company laid some 300 miles of 4 to 8-inch supply gathering lines in the Texas and Oklahoma Panhandles and in New Mexico; cold weather and some snow problems were the biggest weather headache for Sheehan spreads.

Corrosion Protection. For main line and supply system corrosion protection, an application of coal tar primer, coal tar enamel with glass wrap and kraft paper was used, generally over the ditch. Since gas discharge temperatures in excess of 125° F are anticipated downstream of stations, at near capacity flow, a high temperature coating system was used for 25 miles below station discharge; this consisted of primer, a hot line coal tar enamel with glass inner wrap reinforced with an outer wrap of asbestos felt.

The entire system will be under cathodic protection with both rectifier-ground beds and sacrificial anodes being used. Power for cathodic protection will be obtained from commercial lines, remote gas engine generator units, and by electric power swapouts with other pipe lines such as El Paso Natural Gas Company who has parallel lines along much of the ROW.

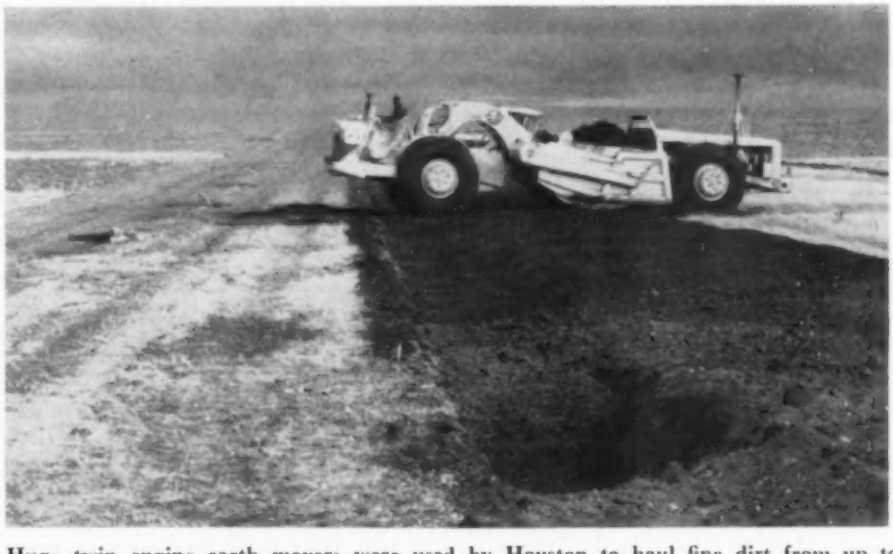
Internal Coating of Corrosive Gas Gathering Lines. Gas gathered in the Puckett Field of West Texas contains from 30 to 34 percent CO_2 which, when combined with moisture and other components in the gas stream, would be highly corrosive. Piping in these fields, ranging in diameter from 6 to 16 inches was protected by an in-place application of epoxy coating. Each gathering line that had a potentially serious CO_2 problem was equipped with a pig launcher and trap; these along with field drips were also coated with epoxy resin before assembly so the entire system is protected. Even the meter runs are protected, having a cadmium plated interior wall.

Backfill—Hauling and Sifting. Special care was taken to protect the coating on all rock spread work. Houston spreads used eight large earth movers including a giant twin-engine unit. These could haul up to 21 cubic yards of suitable backfill material from wherever it could be found near the right-of-way and dump it alongside where a front-end loader with a 4-yard bucket was used to pad the pipe line.

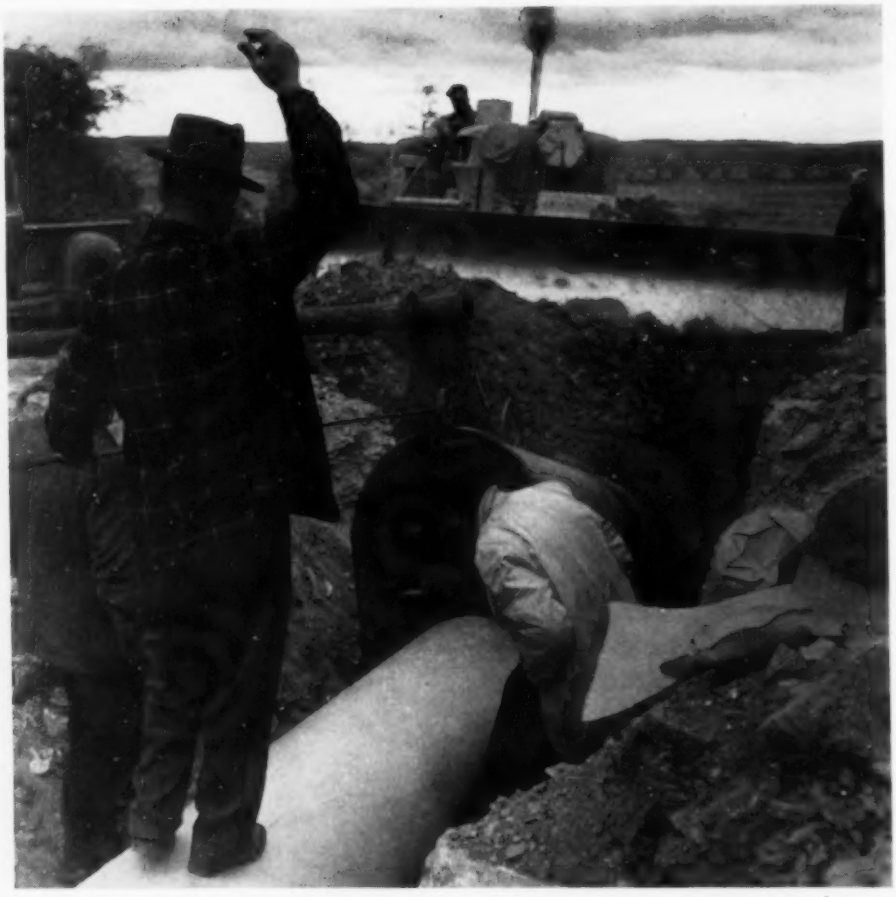
Rotary type backfill sifters were used on some spreads; these performed best on 20-inch diameter lines and below. With a very rocky spoil bank 900 feet of padding a day was

Coal tar was chopped, conveyor loaded into dope kettles and melted at night, assuring that five pots were ready for next day's work on Houston's spread. Two men from dope gang handled night shift loading and "cooking."

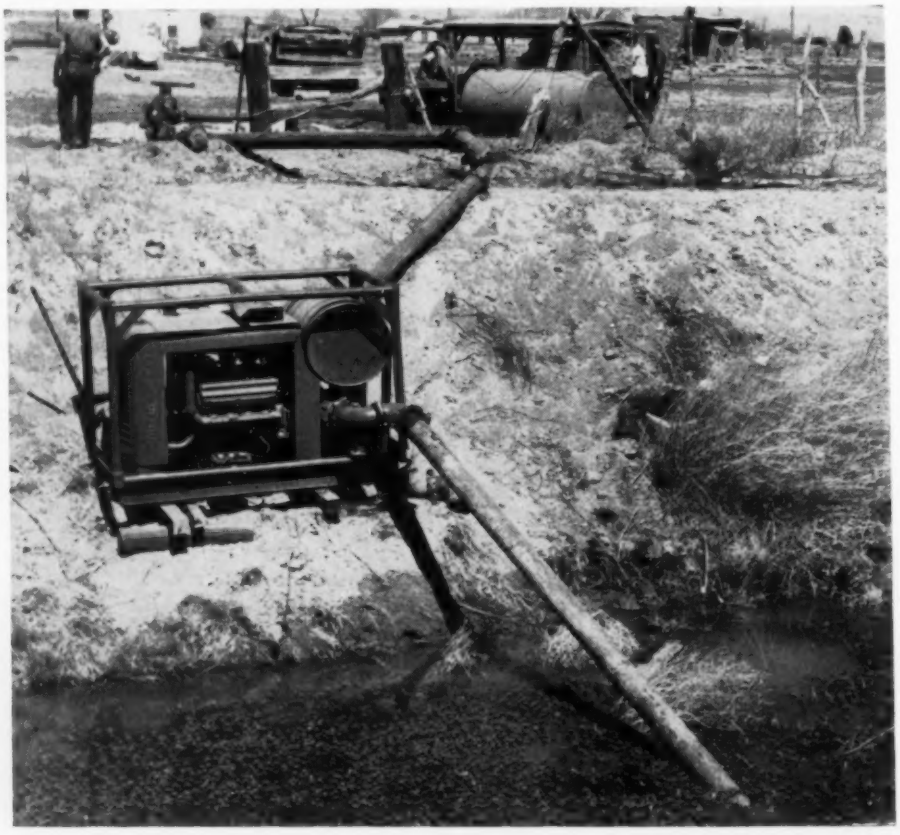
Price dope gang made good time on main line near Kingman, Ariz.



Huge twin engine earth movers were used by Houston to haul fine dirt from up to two miles away to provide smoooth cover for pipe. These giant haulers dumped dirt alongside ditch. Front end loaders then placed it in the ditch.



To protect pipe coating from rocks in backfill, H. C. Price used this "lizard" pulled along the pipe on a rubber roller. Spread Boss Abe Reutzel gives 'dozer operator signal to scrape spoil bank over lizard.



Test water is taken from an irrigation canal just west of Rio Grande for hydrostatic testing of the 30-inch main line. Water was filtered by screen-type, quick back-flushing filter in background.

a representative day's work for this machine.

Price spreads used a pipe riding lizard to protect coating during backfill. A tractor towed the lizard which rode along the pipe on a rubber roller while the dozer backfilled the ditch. Coated pipe was thus protected from rock damage.

Rio Grande Bent Bridge. Transwestern's crossing of the Rio Grande River near Belen, N. M., is a distinctive one. Here the 30-inch main line makes a single overhead crossing with an aerial span of over 3,000 feet. The bridge provides for a second 30-inch carrier pipe. Although the Rio Grande is only about 300 feet wide normally at this point the long span was necessary to clear over irrigation canals on each side of the river and over the flood control levees. Trestle bents are driven into the river bed to a depth of 128 feet. Trusses clear the irrigation canals by more than 30 feet. Bridge designer was Matthews, Keenan & Edens; it was built by Harry Newton, Inc.

Line Design. Maximum operating pressures for the 30-inch mainline of Transwestern will be 1,008 psig; for the 24-inch laterals 1,048 psig is the upper pressure limit; for the 20-inch portions 1,052 psig.

With full opening spherical plug valves and scraper traps the entire main line is designed for on-stream pigging. Every lateral of one mile or more in length is likewise equipped with scraper traps. All main line block valves are equipped with operators. For a comprehensive story on the design and construction of stations and planned operation of the Transwestern line see the article starting on Page 30 this issue.

Testing. Test pressures on the Transwestern main line were 1109 psi. Eastern sections of the main line were tested with gas. Hydrostatic testing was used on the main line sections west of the Rio Grande river. Despite a rupture that occurred during latter phases of gas testing in New Mexico which was reportedly not the result of field girth welds or construction practices, the over-all testing and inspection results were excellent.

ACKNOWLEDGMENT

PIPE LINE INDUSTRY thanks all of the contractors, their engineers and field management with a particular acknowledgment to Mills Cos. president, N. E. Turner, vice president for engineering and operations, and Paul McBride, manager of operations for Transwestern Pipeline Company for valuable assistance in the preparation of this report.

Contractors and Manufacturers on Transwestern Pipeline Company's System

Engineering Design—Gulf Interstate Company.

Contractors

Main Line—Houston Contracting Company, H. C. Price Co., and R. H. Fulton & Co.

Laterals—Sheehan Pipe Line Construction Company and Western Pipe Line, Inc.

Stringing—Parkhill Truck Co., J. O. (Red) Willett Pipe Line Stringing Corp., and Dunn Bros., Inc.

Main Line Stations—Mid Valley Inc. Auxiliary Stations—Delta Engineering Corp. and Hudson Engineering Corp.

CO_2 Removal Plant—Brown & Root, Inc.

Internal Coating—Internal Pipeline Maintenance Co.

Pipe Suppliers

Main Line Pipe—Bethlehem Steel Co., National Tube Co., Republic Steel Co., Kaiser Steel Co., Consolidated Western Steel, and American Bridge and Iron.

Laterals—A. O. Smith Co., Youngstown Sheet & Tube Co., National Tube Co.

Gathering—Lone Star Steel Co., and Jones & Laughlin Steel Co.

Protective Coating

Coal Tar Primer & Enamel—Koppers Co., Pittsburgh Coke & Chemical Co., Reilly Tar & Chemical Co., Plastics and Coal Chemicals Division, Allied Chemicals Corp.

Wrapping—Outer Wrap—Kerr-McGee Oil Industries, Inc., Pipe Wrap Division.

Glass Wrap—Johns Manville Corp., and Owens-Corning Fiberglas Corp.

Kraft Paper—Benson Paper Co., Carpenter Paper Co., and Magnolia Paper Co.

Valves

Main Line—Rockwell Mfg. Co.

Check Valves—Frank Wheatley, Inc.

Suction & Discharge, & Other Station Values—WKM, division of ACF, Industries, Inc., Grove Valve & Regulator Co., Walworth Co., Rockwell Mfg. Co., Cameron Iron Works, and Crane Co.

Valve Operators

Main Line—Shafer Valve Co.

Stations—Ledeen Mfg. Co., E. I. M. Co. and Philadelphia Gear Corp.

VHF Radio System—Motorola Communications.

Cathodic Protection—Duriron Corp., and Brance Krachy Co.

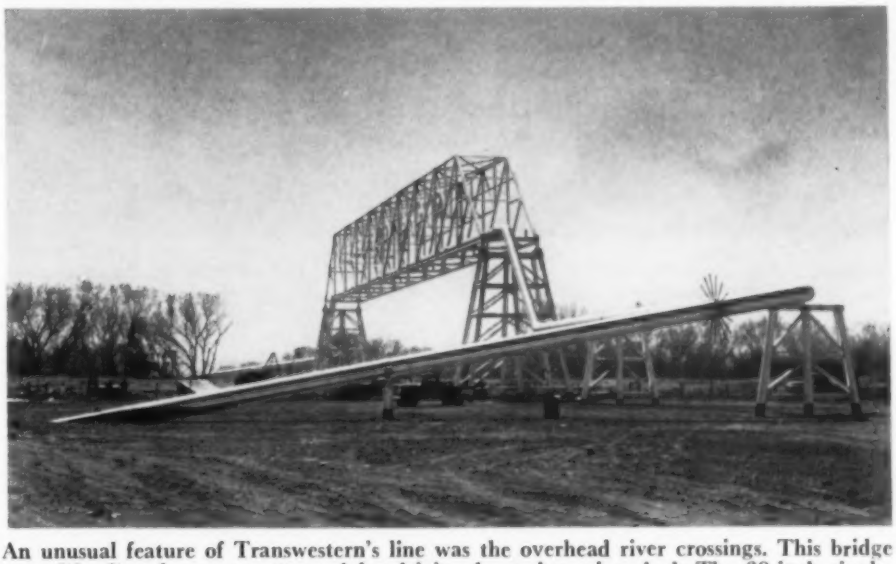
Double Jointing Yards

Crose Perrault Mfg. Co., and Lincoln Electric Co.

X-Ray Inspection—Industrial X-Ray.

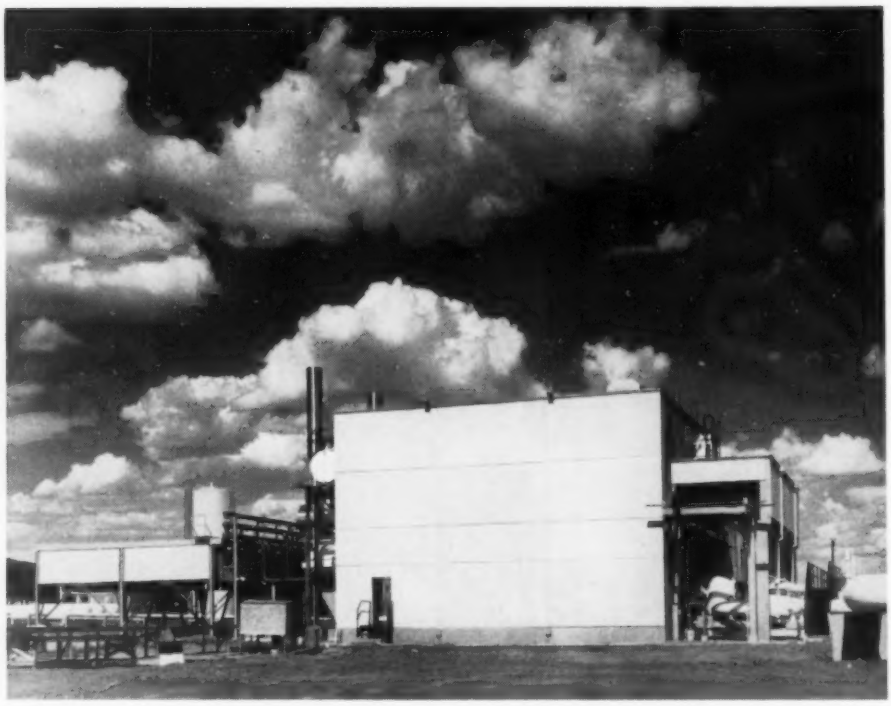
Hydostatic Testing—Williams Pressure Service.

Ominous skies and drifting sand foretell a snowstorm about to break on Houston spread near Corona, N. M. One blizzard brought 36 inches of snow and drifts 12 feet deep.



An unusual feature of Transwestern's line was the overhead river crossings. This bridge over Rio Grande was constructed by driving bents into river bed. The 30-inch single-line crossing is suspended over 3,000 feet to pass over irrigation canals and lowlands. Rio Grande is 300 feet wide at this point.

Gathering lines in the West Texas Puckett field, ranging from 6 to 16 inches, were internally coated with epoxy resin in-place. Input end of a 24,000-foot, 8-inch section can be seen through dual metering run near wellhead. Coating applied by Internal Pipeline Maintenance Co. protects pipe against CO_2 content gas from this field. Meter runs were cadmium plated internally.



Thoreau, N.M., main-line station illustrates the modern design on Transwestern's system. Precast concrete compressor building houses two engines and their speed increasers. Centrifugal gas compressors are located outside the building under shelter overhang and crane. Only gas to enter building is low-pressure fuel gas.

Stations Slick, Efficient And Pushbutton Controlled

Fingertip pipelining comes of age; the dispatcher will control Transwestern's entire system from the ultra-modern center in Roswell

By Donald M. Taylor, Engineering Editor
PIPE LINE INDUSTRY

IN DESIGNING the Transwestern Pipeline Company system, Gulf Interstate Co. engineers have given the pipe line industry another nudge in the direction of complete automation. In fact, the Transwestern system has almost gone the distance in this respect. By November all of its main line stations will be under complete control of the dispatcher in the company's ultra-modern center now under construction in Roswell, N. M. At that time, all of the field personnel stationed along the 645-mile main line that runs from Roswell to a delivery point at Needles, Calif., will abandon their roles of temporary operators and revert to maintenance and repair men. There are to be no operators.

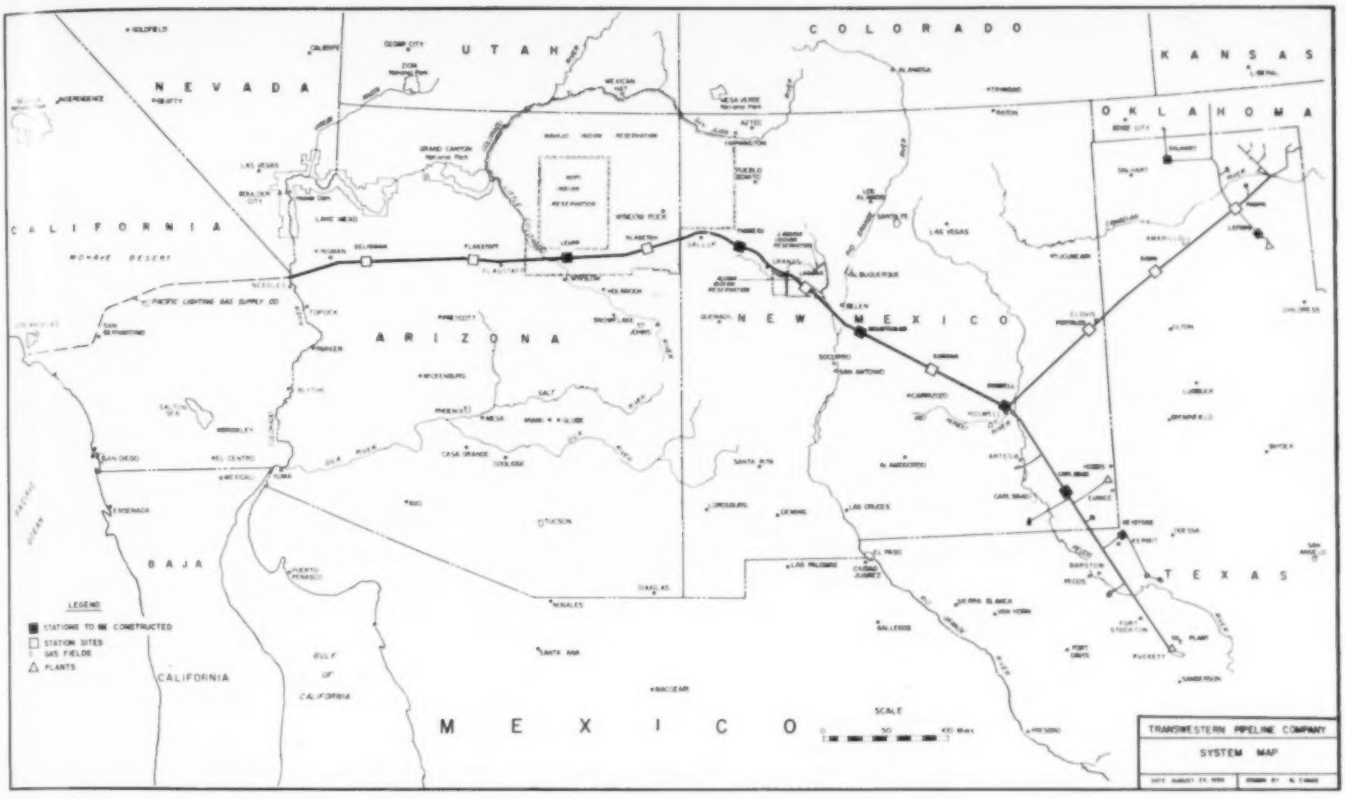
Aside from refinements in equipment, the only remaining step in the march toward complete automation will come when a computer takes over for the dispatcher and makes the decisions as to horsepower settings, line packs, etc. But in a sense, this, too has been accomplished in the design of the Transwestern system. For in the dispatcher's office there will be an analog computer which has the Transwestern system's characteristics incorporated in its circuits. This computer is divided into two sections: one is a PIPE LINE SIMULATOR which can solve the Panhandle Equation as related to the Transwestern system; the other is a COMPRESSOR ANALYZER which gives the dispatcher a quick solution to problems involving horsepower, gas flow, engine speeds etc. For instance, if the dispatcher dials a station's suction and discharge pressures, the suction temperature and flow rate into the machine, he can quickly read station horsepower, rpm and bmep of the engines and compressor efficiency for the station.

So convenient and easy to use is this computer that the Transwestern system will be COMPUTER CONTROLLED to a degree. It will have all the advantages inherent in the computer plus the additional advantages of human judgment.

Aside from automation, another highlight of the Transwestern system is its fuel economy. By selecting a highly efficient engine and coupling it with an efficient speed increaser and centrifugal compressor, engineers came up with stations which will consume only six cubic feet of fuel gas per horsepower hour. This is remarkable, for the industry-wide average probably exceeds 10 cubic feet per hp hour. So sizeable is the pipe line fuel bill that gas companies have wryly admitted, "We are our own best customers."

INITIAL STATION SPACING AND HOW IT WAS CALCULATED

Take a look at the map, and you will note that initially, only four of the proposed nine stations were constructed on the 30-inch main line.



Transwestern Pipeline Company system map. Note that only four of the main-line stations are being constructed at this time. Stations which were constructed are shown in solid black. The fall in elevation at the western end of the line is so great that two of the planned stations can be omitted until gas flow climbs considerably above the initial figure.

Each has two 3,500-hp, four-cycle gas engines, and in most details the four 7,000-hp stations are as alike as peas in a pod. Distance between stations however, varies widely, and this point brings up one of the interesting engineering problems which confronted the line's designers:

The probable market growth, size of the line and other factors led Gulf Interstate and Transwestern engineers to plan for an ultimate expansion to 14 compressor stations. Nine were planned for the main line, three for the 24-inch Panhandle lateral and two for the 24-inch West Texas lateral.

As with most pipe lines, the practical approach in the beginning was to install alternate stations initially and plan to add the remainder as future market growth warranted it.

Following this plan is usually simple on an average pipe line system. Elevation changes are gradual, and stations can be spaced at regular intervals. As a rule, designers can calculate a satisfactory elevation correction by assuming a constant slope between stations. On basis of fluid density, the difference in head can be calculated and half this value added to P_1 and half added to P_2 in the flow equation.

But the elevation of the Transwestern right-of-way varies sharply between stations, and the above method of calculation required that the entire line be broken into small sections of equal slope and a head difference be calculated for each.

A better method which offers ease of calculation and yet gives suitable accuracy was used by Gulf Interstate engineers for this series of computations. It is based on work by Ferguson, and can be solved in two parts. The first step is to determine the equivalent lengths of line by tabulating lengths of equal slope and multiplying each length by a head correction factor. These partial equivalent lengths are added to get the equivalent length for the whole section. This calculation need be made but once for each flowing temperature and specific gravity of gas.

The designers of Transwestern then entered these equivalent lengths into the Modified Panhandle Equation and corrected the P_2 factor in the equation by multiplying its square by e^s where:

$$s = \frac{2 \triangle H}{ZRT}$$

$\triangle H$ = Elevation difference between stations in feet
Z = Compressibility factor at flowing temperature and average pressure
R = Gas Constant
T = Flowing Temperature in °R

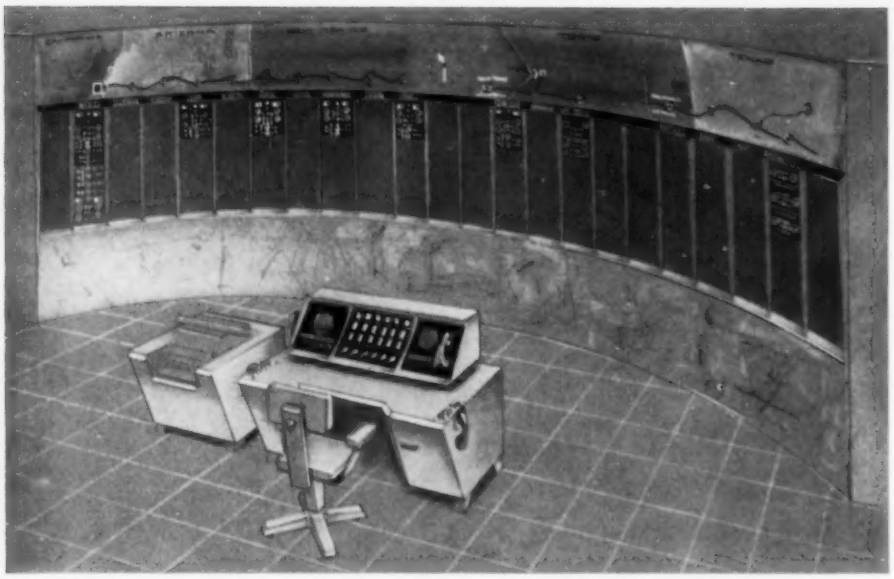
The Panhandle Equation can then be expressed as:

$$Q = K \frac{P_1^2 - e^s P_2^2}{L_T} \qquad 0.5394$$

L_T = Equivalent Length
K = The physical constants of the Panhandle Equation

Another factor which must be considered in calculating station spacing is the amount of fuel gas taken from the line. This, of course, is a simple matter so far as calculations are concerned.

The above method was used to determine the station spacing—initially and ultimately—for the system. Here is the way it came out for the original



Dispatcher's desk and the panoramic display on the wall have all the earmarks of the pipe line of the future. At the desk, the supervisor can exercise pushbutton control of the stations. He can send orders and watch the panorama on the wall to see that they are executed. But he is not saddled with the task of constantly scanning the big board. When something goes wrong, an alarm shows at his desk. He can pinpoint it by glancing at the big board.

stations which will comprise a balanced system:

Station	Distance to Next Station	Elevation
No. 9 Roswell, N. M.	118 mi.	3,600 ft.
No. 7 Mountainair, N. M.	140 mi.	7,000 ft.
No. 5 Thoreau, N. M.	157 mi.	7,300 ft.
No. 3 Leupp, Ariz.	230 mi.	5,000 ft.
Sales meter sta. at Needles, Calif.,	700 ft.	

At 200 MMcf, Gas Flows "Backward!" The change in elevation in the last 230 miles of the line accounts for what may seem an oddity to "flatlander" pipeliners. The elevation change is so great that when the line is flowing only 200 MMcfd, the pressure gages at Needles read higher than those at the Leupp compressor station. Seemingly, the gas is flowing backward—from low pressure to high pressure. Explanation, of course, can be expressed in terms of head.

Pressure Limiting Stations were installed at two points on the system to prevent excessive pressures due to elevation changes. One was installed on the down-slope of the 8,250-ft. elevation peak of the right of way which occurs between Leupp and the Colorado River. This is nothing more than a gas pressure actuated hydraulic valve operator on a spherical plug valve. It pinches the flow when gas pressure threatens to exceed pre-set limits.

DESIGN AND CONSTRUCTION OF THE MAIN LINE STATIONS

Five of the Transwestern compressor stations are almost *exactly* alike. They are the four main line stations and the lateral line station near Carlsbad, New Mexico.

Advantages in this similarity are many. To name a few, it simplifies the work of maintenance and repair forces who must service more than one station. It minimizes the difficulties of trouble shooting when something goes wrong, and it eliminates certain variables in the remote control set-up.

In addition, the almost identical designs simplified engineering, construction and inspection. Back in 1956, Gulf Interstate engineers designed a prototype of these stations for what is now the Columbia Gulf Transmission Co. When additional stations were added, they had the chance to improve designs and the manufacturers improved equipment. And by the time the Transwestern job came along, they had worked out the "bugs" and had, what they deemed, a winning combination. They reasoned that there was little justification for variation between stations other than those needed to meet local conditions.

General layout of the stations. The accompanying illustration shows the general layout of the compressor stations. The compressor building which is of precast concrete houses two engines and their speed increasers, and the centrifugal gas compressors are outside the building. Thus, the only gas to enter the building is low-pressure fuel gas.

The auxiliary building attached to the compressor building houses power generators, starting air compressors and the elaborate control

Computer in control center has Transwestern characteristics built in. This analog computer is a pipe line simulator which can instantly solve Panhandle Equation problems concerning Transwestern line—and a compressor analyzer which can solve problems involving the stations. This computer is so easy to use, that in a sense, it can be said that the system is computer controlled.

equipment. A company garage provides storage for pipe line and compressor station maintenance equipment and houses the boiler used for station. heating. Four of the main line stations have landing strips.

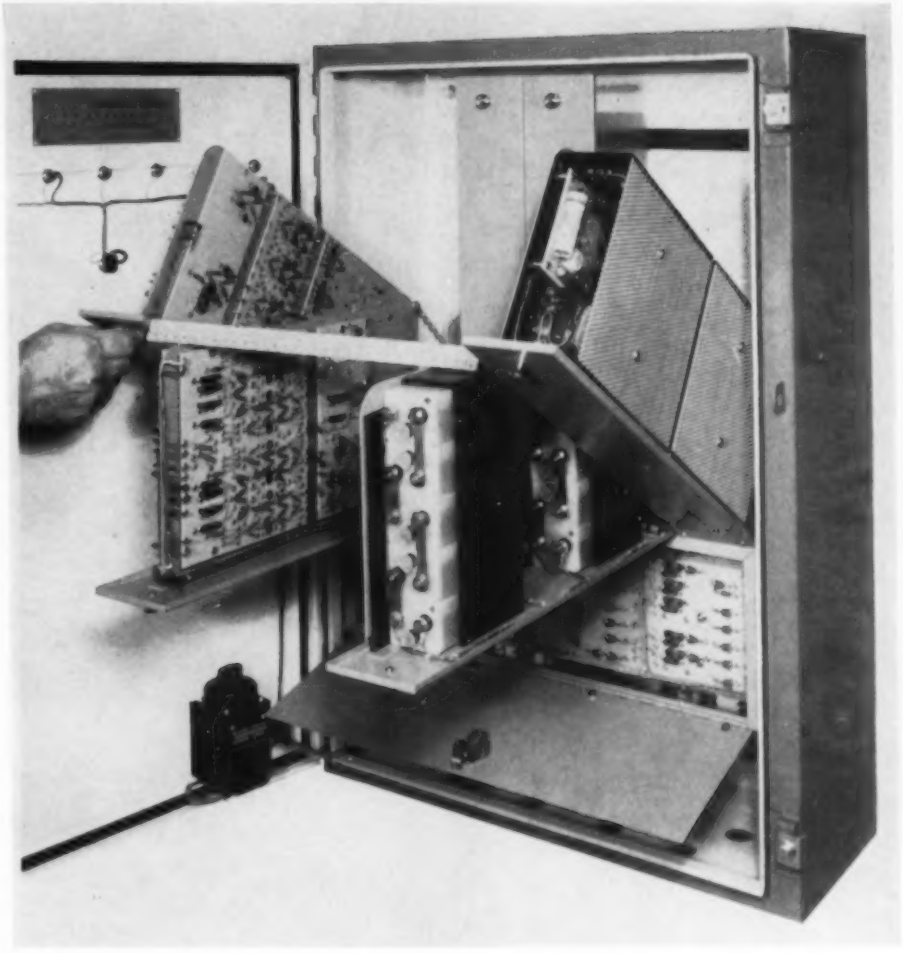
Compressor Engines. Two four-cycle turbocharged LSV-16's were installed at each of the five stations. This gives each a nominal horsepower rating of 7,000. But two engines can be loaded to almost 10,000 hp when maximum power is necessary.

Fuel economy. The same type engines have consumed an average of about 6.2 cu. ft. of fuel gas per horsepower hour on the Columbia Gulf system. But with the latest modifications, Transwestern engineers are expecting even better performance. Factory tests have indicated that at the peak operation just under detonation, the new engines achieve a thermal efficiency of 42 percent.

Turbo-cooling. By combining an exhaust-driven turbo charger with a boot-strap type intake air cooling the engine maker improved engine efficiency. Here's the way it works. Combustion air is compressed by the exhaust-driven turbocharger. Next, the air is compressed by a second centrifugal compressor, cooled through a heat exchanger and expanded across a turbine which furnishes the drive for this second compressor. This last cycle actually results in a slight loss in combustion air pressure, but the loss in efficiency is more than made up in the additional cooling that comes from extracting work from the compressed air by expanding it across the turbine.

Engine inspection. Gulf Interstate engineers worked closely with the engine manufacturer on inspection of the engines. "Bugs" discovered in the initial operation of the engine were carefully ferreted out and eliminated. Particular attention was given crankshafts because of the high horsepower loads which will be imposed upon them. The manufacturer set up an inspection routine which "bird dogged" each shaft from the steel mill right on through every step in its manufacture.

A **new mechanical coupling** is used on the forward end of the engine as a drive mechanism to couple the crankshaft and the auxiliary drive shaft which powers the engine's lube oil and jacket water pumps. At the opposite end of the engine, a new low speed main drive hydraulic coupling is used in place of the standard flywheel. The latter is an integrated part of the over-all torsional train of the engine.



Solid state control equipment for field booster stations which converts strain gage readings to digital numbers for telephone line transmission. With slight modification, this small console will provide the circuitry to enable the dispatcher to control a station and monitor it, too. The panel at left encodes pressure for telemetering. The second one is a digitizer, changing analog to digital values; the closed panel converts digital readings for telephone transmission. The next panel is a spare, and the next one contains the batteries which supply emergency power. Total consumption of the unit is 15 watts. Panel at right is rectifier.

Speed increasers. Each of the compressors is driven through a two stage double helical, separate helix articulated type speed increaser. The unit is rated at 5,000 continuous horsepower with a maximum output speed of 6,055 rpm. In operation, the engine speed will range from 240 to 360 Rpm (the normal maximum) and the 16.816 to 1 ratio gives compressor speeds ranging from 4040 to 6055 rpm. The gear output shaft drives through a flexible coupling which actually spans the 12-inch concrete fire wall between the engine room and the compressor.

Inspecting speed increasers. At the factory, Gulf Interstate engineers locked a pair of the speed increasers together, then using a motor and a dynamometer, they actually plotted the friction load of the gears.

Centrifugal compressors are well suited for automatic, unattended operation because (1) they eliminate valve plate breakage and valve friction losses; (2) they provide high reliability because the stresses in the machine are more-or-less constant and in one direction—in contrast with the push-pull stress reversals of the reciprocating compressor; and (3) they are high-volume, low-head machines well suited to the expansion of a high volume gas system.

Compression ratio at the Transwestern stations will run about 1.35, and at any value close to this the combination of four-cycle engine and centrifugal compressor will provide an excellent efficiency. The compressors come equipped with two sizes of

Two compressors give main-line stations a compression ratio of about 1.35. Compressors come equipped with two sizes of aerodynamic assemblies—29 and 31-inch impellers, cases and diffusers. Centrifugal units are well suited to automatic and unattended operation.

aerodynamic assemblies (impeller, case and diffuser)—29 and 31-inch.

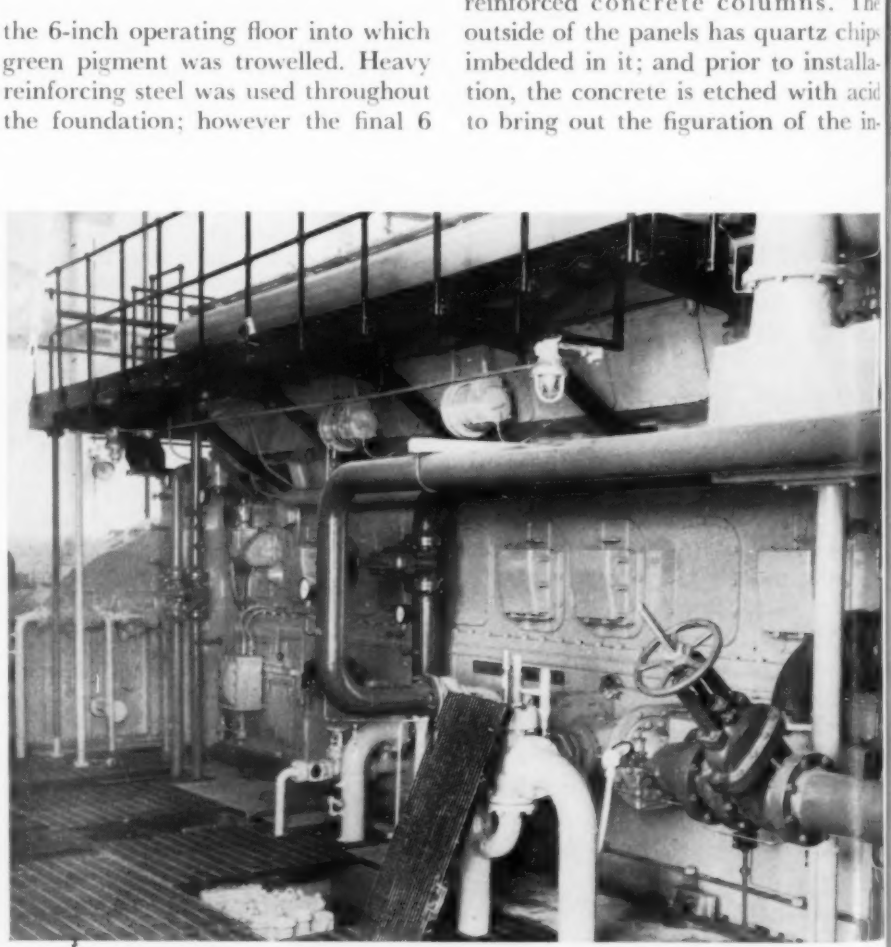
Engine weight presented problems where the stations are 30 miles or so from rail sidings. The gross weight is 200,000 lb. although with part of the equipment removed, it breaks down to 162,000 lbs. for shipment. But this is a sizeable load to haul across mountainous terrain. In hauling engines to the Leupp Station, pipeliners bypassed the bridge across the Little Colorado because of its uncertain capacity, and forded the river with this heavy load.

Engine foundations. These high horsepower packages require substantial foundations. To gain support for the heavy load, sufficient mass to resist vibration and simplicity in construction, engineers designed an all-purpose foundation which supports both engines and heavy concrete building which houses them. In addition, it serves as the operating floor. Its maximum dimension from top to bottom is 9-feet, 9 inches, but, of course, there are knockouts and trenches for piping, etc. This heavy foundation was poured in three lifts. The first ran up to about the mid point; the second carried it up to within six inches of finished grade in most places, and the final pour was the 6-inch operating floor into which green pigment was trowelled. Heavy reinforcing steel was used throughout the foundation; however the final 6 inches of operating floor contained only 6 x 6 mesh temperature steel.

Engine grouting. The engines were set on rails which were bolted to the engine's sole plates then grouted. The sole plates were grouted four inches below the operating floor.

Soil bearing problems. Soil at the proposed building sites was analyzed before construction commenced. In several instances, subsurface drain tile, a sump pump and a polyethylene moisture barrier were installed to minimize moisture content of the bearing soil. At one station, the consistency of the soil was such that the foundation was allowed to settle for a month prior to installation of piping. The settlement was approximately 1 inch!

Pre-Cast Concrete Building. The engines are housed in a 50x56 foot precast fire-proof concrete building. Three sides were constructed of six-inch thick precast panels which were lifted into place and clipped to the reinforced concrete columns. The outside of the panels has quartz chips imbedded in it; and prior to installation, the concrete is etched with acid to bring out the figuration of the in-



Each Transwestern main-line station is equipped with two 3,500-hp, LSV-16 engines. This same type engine has consumed an average of about 6.2 cubic feet of fuel gas per horsepower hour on the Columbia Gulf system. Factory tests indicated that at peak operating condition, just under detonation, these engines have a thermal efficiency of 42 percent.

dividual chips. Size of the panels varies.

The horizontal joints were sealed by a 1x2-inch neoprene gasket and caulking compound. The vertical joints were caulked with oakum and caulking compound.

Columns. All of the reinforced load carrying columns were poured in place.

The building roof is composed of pre-stressed concrete girders supporting precast concrete channels finished off with insulation and a four-ply built-up roof. The two largest girders measure 50 feet by 36 inches deep.

Firewall. A 12-inch fire wall was formed on the job and poured in two lifts. This wall separates the engines and gears from the compressors outside the building. It is designed to withstand an explosion pressure of 100 pounds per square foot plus a 25 pound per square foot wind load.

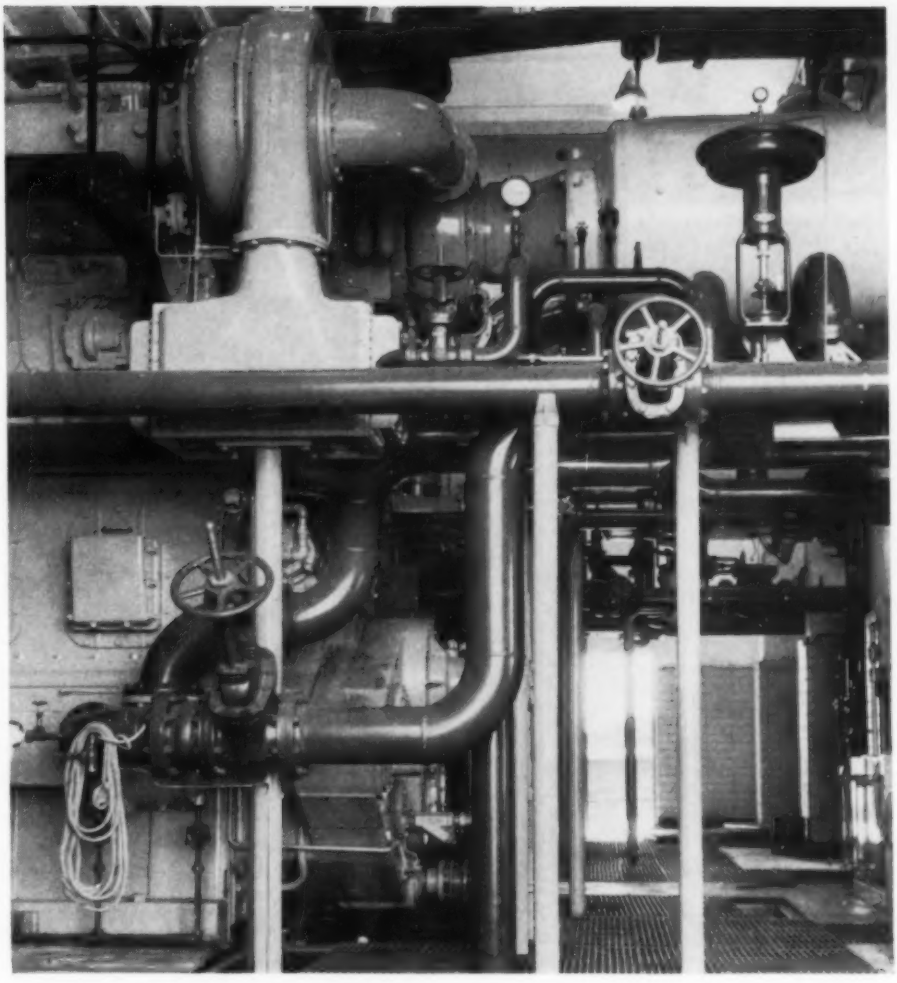
Cooling Water. A small step-down gear at the forward end of each engine drives the fan in the individual atmospheric cooling sections. Prior to commencing operations, this shaft assembly was run in at 200 rpm for eight hours by a temporarily installed 100-hp engine with a power take off. This insured that the bearings were satisfactory, and there was no excessive vibration.

The circulating water is composed of 50 percent glycol and 50 percent water to prevent freezing.

Jacket water temperature controls are conventional; during start up, a butterfly bypasses the cooling coils until operating temperatures are reached. Heat rejected to water: 1,300 Btu's per hp-hour to jacket water; 285 Btu's to lube oil cooling water.

The surge tank is compartmented: ⅓ for lube oil cooling water; ⅔ for jacket water.

Two circulating pumps are located on the surge tank. Both are two hp. One continues jacket water circulation after an engine goes off the line to prevent excessive jacket water temperature (above 185° F) which would cause controls to prohibit restarting of the engine. The other pump delivers water to starting air compressor when no engine is running. Ordinarily, the air compressor obtains cooling water from the lube oil cooling system.



Engines are equipped with superchargers and turbo-coolers for maximum efficiency. Combustion air is compressed by exhaust-driven turbocharger; then air is compressed by a second centrifugal compressor and expanded across a turbine that drives this second combustion air compressor. Cooling water and lube oil piping (above) passes through precast concrete panel wall to atmospheric fan coolers behind station.

High-Pressure Gas Piping. All suction and discharge piping is low chemistry, low yield API 5LX-42 pipe. This selection is based on high ductility and resistance to fatigue. For strength engineers have relied on wall thickness. The 24-inch has 0.687 wt/the 30-inch, 0.875 wt.

Welding. The pipe was preheated to 400° F before all welds. A heating torch was used, and temperature was judged with a temperature stick. To minimize cooling during the weld, two welders were used on every weld, and no weld was left until complete. In cold weather the welds were wrapped with asbestos to eliminate the possibility of temperature cracks. Mild steel electrodes were used throughout the job.

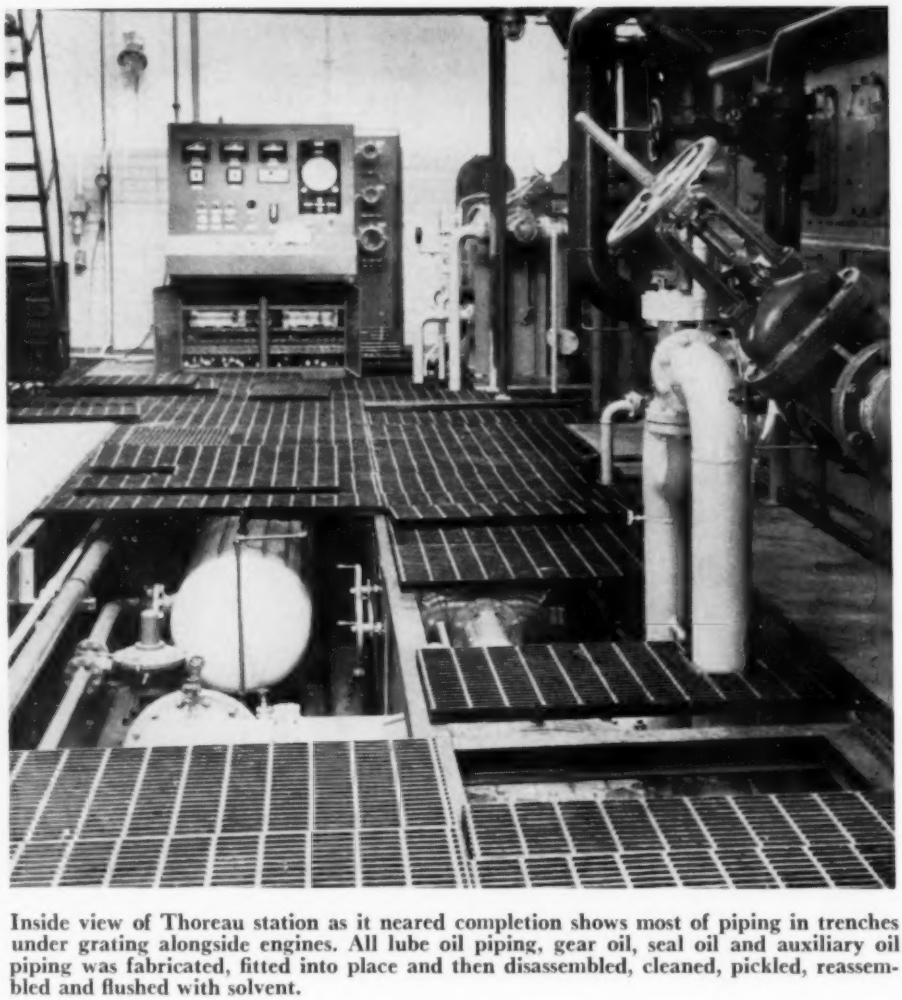
Testing. All high pressure gas piping was hydrostatiscally tested to 1,400 psi. X-rays were also taken.

Pipe frabicating. Much of the piping was pre-fabricated under the above conditions. Sufficient "loose ends" were allowed for field fitting.

Valving. Spherical plug valves were used. Each was equipped with an operator for automatic operations.

Strainers. Two strainers made by drilling a series of ¾-inch holes in a circular section of four-inch plate were installed ahead of each compressor to minimize the chances of foreign objects getting into a compressor.

Scrubbers are the dry-type which utilize the centrifugal effect of the vortex to sling out particles of dust and water. Gas enters the scrubbers between tube sheets, flows into one of many short lengths of 2-inch pipe and is set whirling at high speed around a 1-inch pipe inside each two-inch. Heavy particles are centrifuged from the gas and desposited on an open-end cone at the bottom of each 2-inch pipe. Clean gas goes up the 1-inch pipe in the center. This scrubber, which has no moving parts and



Inside view of Thoreau station as it neared completion shows most of piping in trenches under grating alongside engines. All lube oil piping, gear oil, seal oil and auxiliary oil piping was fabricated, fitted into place and then disassembled, cleaned, pickled, reassembled and flushed with solvent.

requires little maintenance other than blowing off dust, is highly effective.

Low-Pressure Piping. Inside the compressor building most of the piping is in trenches. The operating floor is open. All the lube oil piping, gear oil, seal oil, centrifuge and generator oil piping was completely fabricated and fitted into place—then disassembled, thoroughly cleaned and pickled, re-assembled and flushed with a hydrocarbon solvent.

Utilities and Auxiliaries. The power requirements of the stations are not great; however, the power supply must be dependable because of the electrical controls. To achieve virtually 100 percent dependability, engineers have a battery system which floats on the line with the 280 kw generator. Should the generator fail, the batteries will supply the instruments until a small standby generator can come on the line.

Steam heating. All of the buildings are steam heated by a small but highly efficient self-operated boiler. Liquid in the boiler is an azeotropic mixture of Dowtherm and water—the ratio is 53 to 47 percent. Purpose: to prevent freezing.

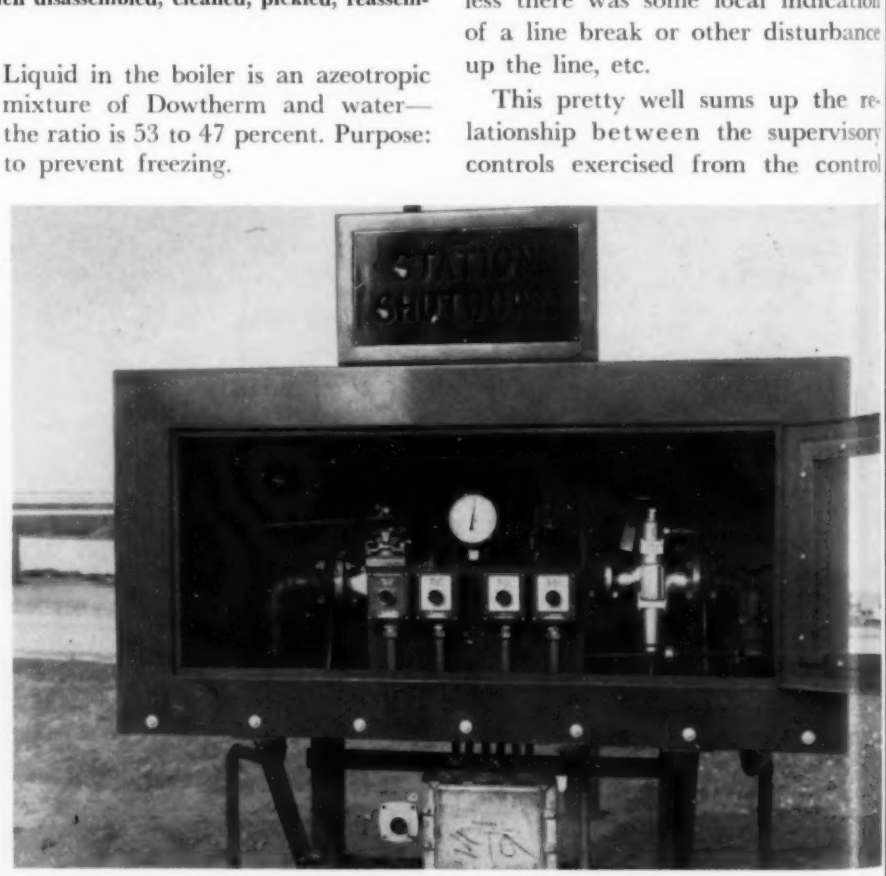
STATION CONTROL SYSTEMS

The control philosophy implemented on the Transwestern system can be summed up, *"local automation plus remote supervision."*

The relationship of the two phases can be compared iwth that of having a crack operating crew at the local station—fully capable of handling all emergencies, starting, stopping engines etc.—but reporting information by phone and taking orders from a distant boss. The latter gives instructions to raise or lower discharge pressure by starting, stopping or changing the speed of the engines. But the "boss" does not instruct his local "crews" in the many details involved in, say, starting an engine. Nor does his local "crews" have to await his instructions to shut down the station in case of emergency.

It would not make sense for the distant "boss" to be saddled with such details. It would put too great a dependence on the communications system. Common sense would indicate that in event of communications failure, the local "crew" should continue operating the station, meeting discharge pressure requirements unless there was some local indication of a line break or other disturbance up the line, etc.

This pretty well sums up the relationship between the supervisory controls exercised from the control



Control panel for station shutdown located by walk outside auxiliary room. In addition to station shutdown valve, panel also has switches to control fire pump and emergency equipment in compressor area, main building and auxiliary room.

center in Roswell and the local automation installed at each of the main line compressor stations. Linking the two is a wire line telemetering system which utilizes a teletype quality wire line circuit. By encoding and decoding information or instructions in terms of pulses which must actuate certain relays in certain sequences, information and instructions can be sent and received with little chance that false signals or stray currents can cause trouble.

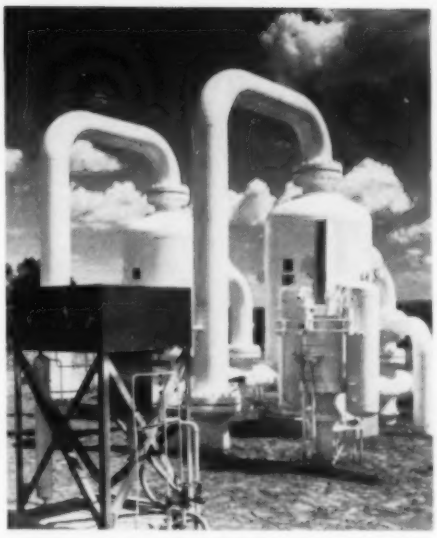
Local Controls. In a properly designed automatic station, the safety controls must be interwoven around the operating controls and so interlocked that the safety features can override the other controls. Here are some of the safety control features:

Emergency shutdown and blowdown system. When pressure in a one-inch air piping system that runs throughout the station yard exhausts, it triggers gas actuated valve operators that shut the main line fire gate valve above and below the station. After the valve closes, an 8-inch relief valve is actuated to blow down the high pressure gas in the station piping. In addition, fire doors and ventilators automatically close.

This system can be manually or pushbutton actuated from several vantage points. It will also be instrument actuated by high discharge gas temperature, low suction pressure, a pipe line break and a fire or an explosive gas mixture in the engine building.

Fire detection and fire fighting. Fire eyes and temperature sensing switches at strategic points can actuate alarms and emergency sequences. A sniffer—or a gas analyzer is on guard constantly, too. Should a fire be located in the auxiliary room the CO_2 bottled gas system starts discharging to snuff it out. In the main building a fire causes fire pumps to start directing water to the sprinkling system.

Engine starting sequencing. The starting of an engine is a complex matter because of the many safety precautions which must be observed. The sequencing starts with the engine purging itself of possible fuel gas as starting air rolls it over. From this point on, the instrumentation makes a series of checks as each step in the starting procedure is taken. At certain points, time delay limit switches can override the controls and discontinue the engine starting sequence. For example, if lube oil fails to reach a certain pressure in a certain length of time, the engine starting is stopped.



Scrubbers and control panel at upstream main-line station block. These scrubbers are dry-type which use centrifugal vortex effect to remove solid particles and condensed liquids. They have no moving parts and require little maintenance; efficiencies range up to 99 percent.

Engine control console at Thoreau station. Start-up sequence begins with engine purging of fuel gas as starting air turns it over. Instrumentation and time delays continue starting sequence. In operation, the principal controlling device is the discharge pressure controller which controls and monitors set point.

The Station Centralized Control Panel. The station centralized control panel is actually composed of three separate but interlocked panels, one for the general station and one panel for each engine (There are two engines installed in each mainline station). The data sent to the various panels are clearly shown in the schematic drawing. Some of the data is merely indicated, while other data is continuously monitored and an alarm sounds if necessary. The important data; discharge and suction pressures, the set point, the gas flow rate through the station and the engine speeds are recorded in the various panels.

The following data are merely indicated on the station control panels:

- Suction fire gate, open or closed
- Discharge fire gate, open or closed
- Communication circuit voltage on battery stand by
- DC voltage low
- Station test
- Surge
- Set point deviation
- Start air pressure high
- Start air pressure medium
- Start air pressure low

A flow computer mounted in the panel continuously computes the quantity of gas passing through the station. An AGA large diameter orifice meter run was integrated within the suction gas piping to the #1 compressor. The data from this orifice meter is continuously fed into the flow computer for its computations.

The discharge pressure controller is the prime controlling instrument at the station. It receives a set point from the dispatcher, acknowledges it, and sends pneumatic signals to the engines to meet the new discharge pressure set point.

BMEP is controlled during engine acceleration by a controller and orifice arrangement that limits the amount of fuel gas fed to the engine according to the volume of intake air.

Eliminating surges in pressure as a second engine comes on the line is accomplished by slowing down the engine already on the line until the second engine is loaded. Then the two come up to line pressure together.

Malfunctions that cause shutdown and lockout which require personnel at the station to correct the trouble and re-start the engines are:

- Vibrations: fan, engine, gear, compressor and gas piping.
- Low pressure: engine oil, turbo oil, gear oil.
- High pressure: engine crankcase.

Malfunctions that shutdown, but allow re-starting by the dispatcher are as follows:

- High pressure: engine oil, gear oil,

and discharge gas.

High temperature: engine oil, jacket water, starting air, gear oil, compressor case, compressor thrust bearing.

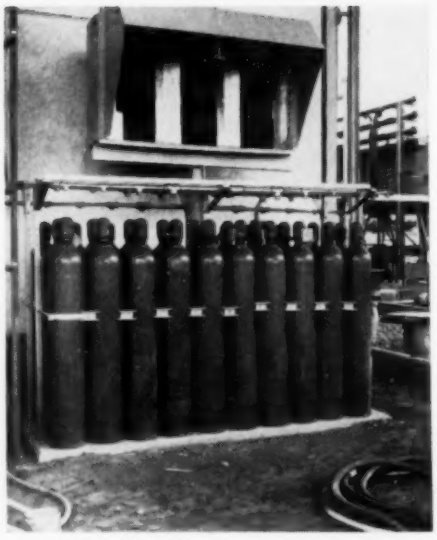
Seal oil accumulation tank level high or low.

Seal oil tank level high or low

Engine valves position false, oil level high, overspeed or detonation.

Supervisory Controls. The Roswell control center is the vital control point for the Transwestern system. All data from the automatic station will be channeled into this center and displayed on a 9 x 23-foot control panel. From his desk, the dispatcher can see the panoramic display of all the data received from the controlled stations. Supervisory controls are mounted on a console at his desk, and to send new instructions to the stations, he merely pushes the appropriate button and observes the execution of the order on the panoramic control board as the data are telemetered from the station back to Roswell.

One of the features of this control center is the effort made to relieve the dispatcher's fatigue. Seemingly, the constant search of an intricate lighted panel robs the dispatcher of efficiency, and to prevent this, he receives a warning at his desk when alarms appear, and then he can look over the large board to pinpoint the trouble.



Special precautions have been made for fire protection at Transwestern's unattended stations. Fire eyes and temperature-sensing switches located in key points will actuate alarms. This CO_2 bottle system would automatically blanket a fire in the auxiliary building.

Two Manually Controlled Stations. Two of the field compressor stations are presently manually controlled, but even at these stations, the dispatcher can monitor pressures, etc. At these stations all of the monitoring equipment is solid state with only a few mercury-wetted relays used, and with but few modifications this equipment can be expanded to include automatic supervisory signals.

Over-All Effect. The ingenuity incorporated in this automatic, remotely controlled system is almost overwhelming. Part of it comes from the brilliant young engineers on the Transwestern and Gulf Interstate Staffs, the rest of it comes from old timers who were given the chance to have their way in the design and construction of a completely new gas system.

ACKNOWLEDGMENT:

The author wishes to acknowledge the help received from the following Gulf Interstate Co. engineers: Norman Blundell, R. LoChiano; Clarence Taylor; F. H. Botts and Guy Silloway.

MAJOR MANUFACTURERS ON TRANSWESTERN STATIONS

Engine & Compressor Equipment

Engine—Cooper-Bessemer Corporation

Compressors—Cooper-Bessemer Corporation

Gears—Western Gear Corporation

Air Intake Filter—American Air Filter Co.

Start. Air Valves—Ledeen Manufacturing Co.

Jacket Water Butterfly Valve—U.S. Valve & Manufacturing Co.

Fuel Gas Reg.—Fisher Governor Co.

Fuel Gas Meter—Rotron Controls Corp.

Safe Fuel Gas Valve—Fulton-Sylphon Division of Robertshaw Controls Co.

Engine Panels—Tom Niland

Vibration Switch—Eggeholf Engineering Inc.

Gear Lube Oil Filter—William W. Nugent & Co.

Seal Oil Strainer—Elliott Co.

Seal Oil Tank—Vulcan Steel Tank Corp.

Steam Heat. Eng. Room—American Blower Corp.

Main Bldg. Ventilators—The Swartwout Co.

Main Bldg. Forced Vent Fan—Hartzell Propeller Fan Co.

Gas Analyzer—Mine Safety Appliances Co.

Precast Concrete—The Rackle Co.

Cranes—Lypta Cranes, Inc.

Reinforcing Steel—Republic Steel Corp.

Station Yard Equipment

Water Tank—Wyatt Metal & Boiler Works, Inc.

Air Dryers—C. M. Kemp Manufacturing Co.

Boiler Condensate Pump & Boilers—Texsteam Corp.

Station Controls

Union Switch and Signal, Div. of Westinghouse Air Brake; International Control Corp.; Computer, Inc.

Electrical Controls

Magnetrols & Mercoids—Industrial Equipment Co.

Conduit & Wire—Graybar Electric Co.

Seal Oil Level Control—Black, Sivalls & Bryson, Incorporated

Detonation Detectors—Hollis & Co.

Tach. Rec.; Temp. Ind. and Cont.; Press. Trans. Cont. and Rec., Minneapolis Honeywell Regulator Co.

Electronic Fire Det., Inc.—Equipment Manufacturing, Inc.

Cooling Tower Equipment

Cooling Tower Generator Engine—Young Radiator Co.

Cooling Tower Main Bldg.—Arrow Industrial Manufacturing Co.

Cooling Tower Fans—Moore Corporation Ltd.

Cooling Tower Shaft & Tripod Assembly, Fluid Drive—Brance-Krachy Company, Inc.

Fluid Coup. Air Control Mtr.—Annin Company

Water Softener—Infilco, Inc.

Gas, Piping Equipment

Scrubbers—Aerotec Industries, Inc.

Side Gates and Loading Gates—Rockwell Manufacturing Co.

Side Gate Operators & Valve Operators—Ledeen Manufacturing Co.

Fire Gate Operators—Shafer Valve Co.

Check Valves—Frank Wheatley Pump & Valve Manufacturers

Suction Traps—Black, Sivalls & Bryson

Suction Strainers—National Supply Company

Sta. Relief Valves—Garrett Oil Tools, Inc.

Space Heaters—American Blower Corporation

Auxiliary Building Equipment

Gen. Eng.—Ingersoll-Rand Co.

Generator—Westinghouse Electric Corp.

Gen. Switch Gear—Warren Electric Co.

Gen. Eng. Muffler—Gulf Engineering Company, Inc.

Gen. Eng. Air Intake—Mechanical Equipment Company, Inc.

Gen. Eng. Lube Oil Filter—William W. Nugent & Company, Inc.

Centrifuge—Alliger & Sears Company Machinery

Air Compressors—Ingersoll-Rand Company

Aftercooler & Sep.—R. P. Adams Company, Inc.

Air Comp. Cir. Water Pump—Chicago Pump Company

Kohler Generator—Waukesha Sales & Service, Inc.

Power Case—Powell Electrical Manufacturing Company

Motor Control Center—Graybar Electric Company

Transformer—Westinghouse Electric Corp.

Gen. Fuel Gas Bottle—Southwest Equipment Company

Panels—General Electric Co.

Stringing contractor used this maneuverable rubber tired fork lift for stringing the 80-foot coated joints on right of way. Forks were padded with soft rubber facings. There were no instances of damage to the coating as pipe was lowered onto the skids. Long joints were securely controlled during all movement.

Strict Specs Met In Bell-Hole Job

PLGS' 34-inch gas line across the Mojave Desert will operate 'hot'. Stresses were held to a minimum during welding of 80-foot joints of X-52 pipe. Bends and pipe handling were limited

By Melvin A. Judah, Editor,
and **Donald G. DePugh,**
Construction Editor,
PIPE LINE INDUSTRY

DID YOU ever wonder why there are so many contractors and equipment men in the pipe line construction business? One good answer is that almost every pipe line job has unique conditions that often call for a "specialist" and that explains how Pacific Lighting Gas Supply Company could make one of the oldest methods of pipe line construction pay off in laying its new 116 mile, 34-inch line from Needles to Newberry, Calif. The joint venture by Pacific Pipeline Construction Company and Engineers Limited Pipeline Company just completed will take gas from Transwestern Pipeline Company at the Colorado River.

But why did PLGS use the bell-hole method? Chief Engineer Maury Fuller points out these advantages.

- Because this line will operate at greater than normal temperature variation (50°-135° F) the welding specifications on the contractors were somewhat restrictive. The contractor was permitted to weld the pipe line in a continuous string longer than 3,000 feet only when the ambient temperature was between 50° and 90°F. Over the ditch string of welded pipe would have been limited to 3,000 feet regardless of temperature.
- Pipe is lowered in place a joint at a time in conjunction with welding, minimizing coating damage even in the case of high desert temperatures.
- Terrain conditions were nearly ideal for the bell hole method; there were no water table problems in the desert and rock was not a serious obstacle.
- Contractors bid the job both ways, over the ditch and by bell hole. The low bid was by the bell-hole method. Cost figures for 30, 34 or 36-inch pipe in this desert terrain ordinarily favor this method.
- Fewer men are required on a bell hole spread; 200 to 225 actually were engaged in pipe laying operations plus approximately 50 in the double jointing and coating yard. Nearly 300 would be needed for a spread working over the ditch.
- Work continuity is greater working in the ditch; there are fewer shut-

Fork lift takes single 80-foot joint from stringing truck on right of way in desert near Minneola, Calif. All faces of supporting brackets on the truck were padded with rubber sheeting; also all surfaces of fork that contacted pipe.

One of the backfill sifters devised for work on this line is shown as rubber conveyor belt is repaired. Extra care was taken in backfilling to make sure that the line was shaded with 6 inches of cover free of hard clods or rocks over 2 inches in diameter.

downs because of wind. Welding is afforded protection against high heat transfer rates.

All factors are not on the plus side for the bell-hole method as Fuller is quick to admit. High ground water or frequent rainfall in soils that would not hold ditch would rule it out; cost of bell holes in very rocky country would be prohibitive. To minimize the number of bell holes pipe would ordinarily be double jointed and where state laws or mountain roads rule out trucking of the 80-foot joints this would limit its economy. More field patching of coating is often required in using the yard coated pipe in the bell-hole method as well as the need for coating of field joints. And speed of construction generally will be less than with over-the-ditch construction.

Line design. PLGS plans call for operating the new line at elevated temperatures. Because of the premium value on water in the desert area design engineers decided to go to high temperature line operation rather than cooling of the gas. Estimates for the cooling tower needed for the job run about $150,000 for original installation with operations and maintenance costs adding about $2,000 per month.

With a temperature ranging from 50°F up to 135°F plus the effect of the internal pressure pipe would be subject to a maximum longitudinal loading of 990,000 pounds. Designers assumed that none of the axial load would be transmitted to the soil even though the coating was a 225°F softening point coal tar enamel. With the maximum differential temperature occurring on an annual cycle the enamel would be subjected to "cold flow" during six months on each cycle, PLGS engineers predicted. Temperature effects would therefore subject the line to an alternating axial load in straight lengths and a reversing bending moment in curved sections.

To meet these conditions designers took special steps to minimize secondary stresses. Specifications for the 34-inch, 0.469-inch wall pipe required that the line-up clamp be kept in place until the stringer bead was completed on field welds; there was to be no movement of the pipe until the first hot pass bead had been applied. Anchors were specified to limit the bending moment in the design; as an alternative, contractors were given the option of keeping the radius of side bends and over bends sufficiently long so that the pipe line would behave as a column. By increasing cover on over

Clam shell dug bell holes where the desert soils were not too rocky. Much of the ditch was first ripped; ditch was made by ditching machines, back-hoes and clam shells. Blasting was required in some rock country and lava bed flows.

bends the contractor was permitted to shorten the radius.

Specifications required that in no case was pipe to be bent more than 1½ degree per pipe diameter along the longitudinal axis. Normally there was no over-bend in the line in excess of 9 degrees in an 80-foot joint. Side bends were limited to 150-foot radius.

Yard Welding Operations. All of the pipe for the Needles to Newberry line was double jointed and coated at one of two rail head yards by Pacific Pipeline Construction Company. Approximately 300,000 feet was double jointed and strung out of Minneola, California near Barstow while another 300,000 feet of the 34-inch, 0.469 inch wall pipe was double jointed and trucked from Henderson, Nev. At the yard, joints were lined up and tack welded at the first station, followed by a submerged arc inside pass and another semi-automatic external weld.

The welder riding the boom inside the joints controlled the rotation of the pipe; he could start and stop the joints at any point. Ends of pipe were pre-heated with an LPG fueled "spider" burner when ambient temperature was 40°F or less.

Double jointing operations were improved with a new model internal roller type pneumatic line-up clamp. It was particularly useful where there were high-lows between joints. Roller clamps tended to crawl and improve line up or even to roll out a flat without hammering the pipe.

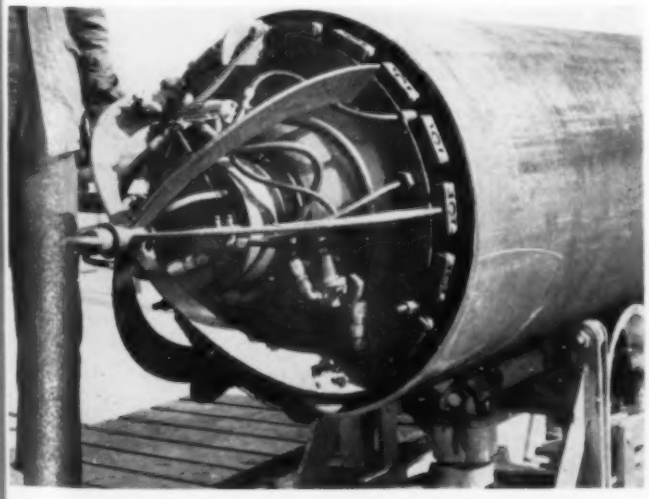
Average rate of production when the rail head yards got into smooth operation was about 10 double joints per hour. Top daily production at the Henderson yard was 127 welds in a 10-hour day. Two passes were made regardless of wall thickness of pipe; all welds were X-rayed.

Bending was one of the most critical operations in construction. The completed line will operate "hot" with gas pack temperatures ranging up to 135°F so special care was taken to minimize stresses. Considering the desert and foothill terrain, it was probably one of the straightest lines ever laid.

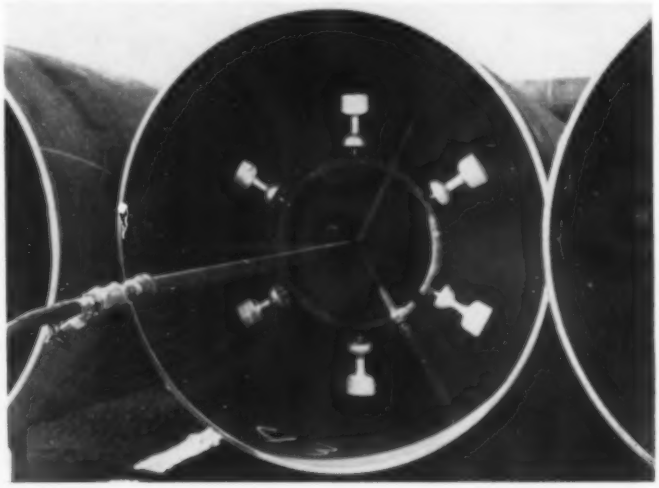
Pacific Pipeline's yards made use of one "old idea" very well; during double jointing rubber inner tube night caps were fitted into the ends of the joints to reduce air circulation through the pipe and resultant cooling of the weld area between passes. All pipe handling equipment in the double jointing yard was air operated.

Coating Procedures. After leaving the welding racks, the 80-foot joints were cleaned, primed, and coated at the same yard. The coating system consisted of coal tar primer, a coat of coal tar enamel with a glass inner wrap plus a second coal tar coating totaling 3/32-inch minimum thickness with outer wrap of 15-pound asbestos felt, providing an over-all protection system of approximately 5/32-inch.

Trucking Liquid Coal Tar. Coal tar was delivered to the coating yard in a molten state from the coke plant at Fontana, California some 125 miles from Minneola. Ordinarily, temperature of the material at the coking plant ranged from 525 degrees to 550 degrees and in transit it cooled approximately 6 degrees per hour. Spe-



New model roller line-up clamp was used at the Pacific Pipeline Construction double-jointing yards. It was particularly effective where high-low areas occurred between joints. The clamp had a tendency to crawl and roll out a bend or flat.



Welding and coating at Minneola, Calif., and Henderson, Nev., were precision-controlled. Here an LPG-fueled spider burner preheats the end of a 34-inch joint before line-up. Baffle behind burner cuts down on air circulation through pipe and atmospheric cooling.

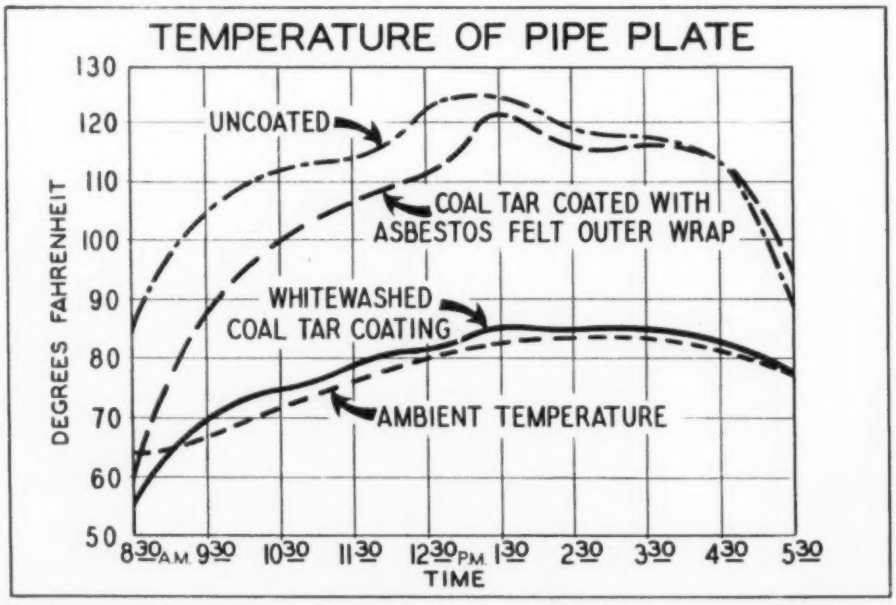
At double jointing yard, first complete weld made was the internal pass made by this boom-mounted welding unit. Welder rides backward as compared with earlier units and contractors reported better control.

After the internal pass final external weld was made by this automatic submerged arc welding machine. Average rate of production for the yard was about 10 welds per hour; peak day was 114 welds in 10 hours.

cially equipped truck tankers were capable of delivering 52 tons of enamel per trip. When operations started, the trailer tanks were protected only with insulation; it was found in a few early loads that some filler dropped to the bottom and tank surfaces became coated with solid enamel. So to prevent settling and to improve enamel transfer at the rail head yard agitators were installed in the tanks.

During the longest hauls, between Fontana and the Henderson yard, the enamel cooled to temperatures from 410° to 450° depending upon ambient conditions. PLGS engineers predict that this is probably the practical maximum hauling distance for molten coatings without heating enroute. At the yards, enamel was transferred to the heated and agitated kettles for direct application to the pipe.

Pipe was grit blasted and, where necessary, heated before cleaning and priming. In this way all primer was applied to a clean, gray metal surface at the rail head yards. In early phases of the operation when early morning temperatures in the desert were low, pipe was preheated prior to application of the enamel.



To double check temperature fluctuations in pipe wall during construction PLGS engineers made a plot of temperature variations on the wall of uncoated pipe, coal tar coated and wrapped pipe, white washed coated pipe and plotted these together with ambient temperature variations against time. The differential in plate temperature on the sunny and shady side of the pipe was measured on the side exposed to the sun and at 180 degrees from it. Whenever the average of these two temperatures exceeded 90°, contractors were required to leave breaks in the line for tie in when temperature was between 50° and 90°. Pipe used in the construction was white-washed to keep it cool while it was strung in the desert.

This method of handling coating yielded a saving of $5—6 per ton. Some 3,400 tons of enamel were used on the entire job.

Temperature Considerations During Construction. At double jointing yards coated pipe was white washed to reduce fluctuations in pipe wall temperatures between day and night that would be caused by the intense sunlight in the desert during construction. Tests were made of plate temperature for uncoated pipe, coal tar coated pipe with asbestos felt outer wrap, and the white washed coated pipe; these were then plotted against hourly ambient temperature.

There was a differential in plate temperature on the sunny and the shady sides of the pipe so temperatures were measured on the inside of the side exposed to the sun and at 180 degrees from that side. When the average of the two temperatures exceeded 90 degrees the contractor was required to leave breaks in the line to be tied in at a time when temperature was between 50° and 90°F.

Bell Hole Welding. Contractors worked out a careful procedure to line up and make field welds in strict compliance with PLGS specifications. Equipment consisted of one tractor mounting four welding generators plus four side boom tractors. The internal line up clamp remained in position throughout the stringer bead weld and no lifting was permitted on the pipe until after the first hot pass.

Step by step, here is how the procedure worked:

- Lead side boom picked up and

From double jointing station, 80-foot joints of pipe moved directly to the cleaning and coating plant. Pipe was grit-blasted and, where necessary, heated before cleaning and priming. Primer was then applied to a clean gray metal surface.

Here the come-along is being returned to the initial coating station by overhead rack. Coating system consisted of coal tar primer, one 3/32-inch coat of coal tar enamel with glass inner wrap and a second coal tar coat with outer wrap of 15-pound asbestos felt.

held a single 80-foot joint at the mid-point in position for line-up upon completion of the first hot pass weld on the previous joint.

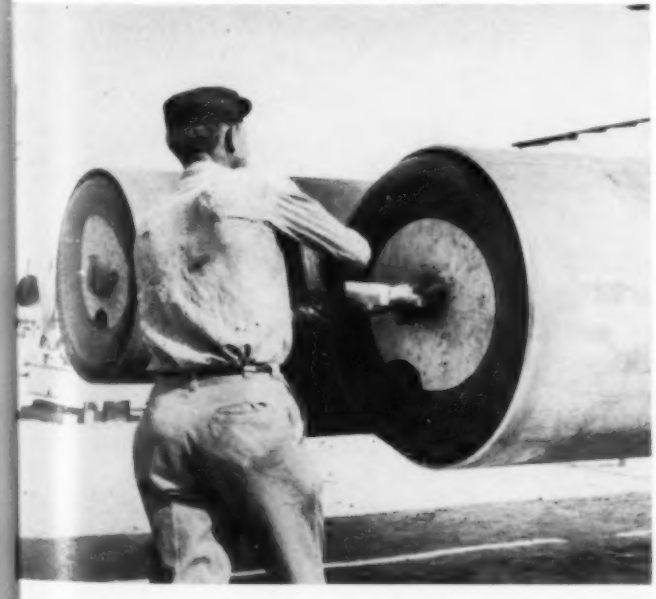
- A second tractor stood by to support the leading end of the joint being welded but no lift was made until hot pass was completed on the "working" joint.
- Number 3 tractor supported at midpoint the joint of pipe being welded.
- While the fourth tractor supported the end of the joint being welded immediately upstream of the weld.

This met the specifications of keeping the line-up clamp in place throughout the stringer bead weld and prohibiting pipe lifting until the first hot pass had been applied. To advance to the next weld the two rear side booms leap-frogged to get the next joint into position and the generator carrier moved up to the line-up station.

To minimize circumferential stresses and speed progress the contractor used four welders on line-up at all times. Immediately upon completion of the stringer beads these welders applied the first hot pass. A fifth welder was assigned to line-up and hot pass for relief.

Right-of-way work on the desert line started in January, welding began on February 11, and welding was completed on June 10. Construction progressed at an average rate of 5,750 feet per working day; the maximum length of line lowered-in and welded in nine hours working time was 8,640 feet.

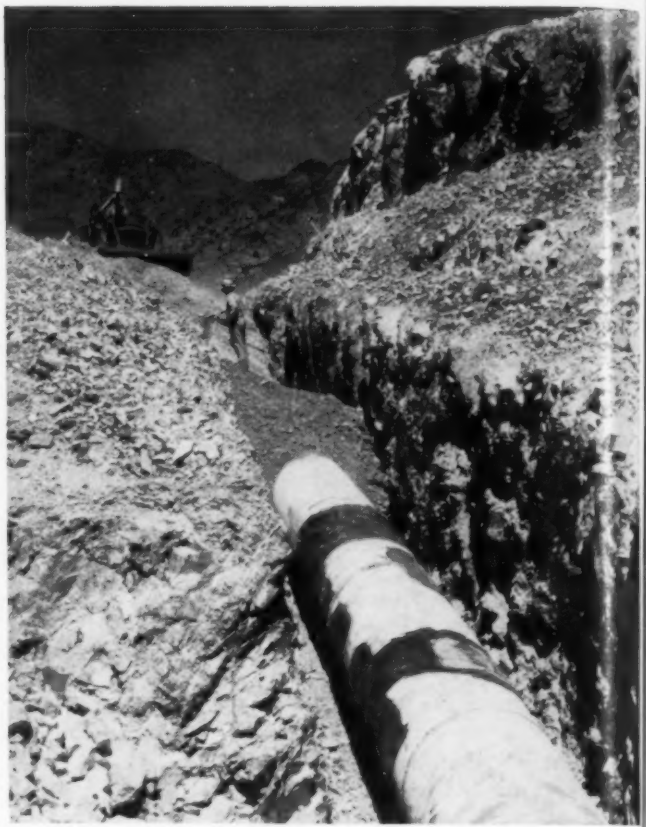
When Transwestern initiates delivery of gas at the Colorado River the $17,300,000 line is scheduled to take 300,000 Mcf daily with design con-



Good use was made of old inner tube at PLGS double jointing yards. From preheat station until all welding operations were completed, ends of the joints were stopped off. Welding inspectors reported this reduced cooling of pipe by air circulation through it, particularly early in morning and when temperatures were low during early days of construction.

Meeting specifications on the Needles-to-Newberry line and making up to a mile and a half a day of completed line called for intelligent and close supervision. Here Lee Erlewine, Engineers Limited Pipeline Co. superintendent; Marcus Buckland, project superintendent, and Frank Whipple, project engineer for PLGS, check construction on the desert spread.

Extreme care was used in making the field welds in bell holes on this line. For line-up, stringer bead and first hot pass contractors used four sidebooms plus a tractor mounting two, dual welding generators. Simultaneous welding in four quadrants during stringer bead prevented unequal thermal stresses around pipe. The 116-mile, 34-inch line was completed in July.



Plenty of excavation was required in some hilly rock areas t meet overbend limitations. Here the line is backfilled with front end loader while man in the ditch screens out large rocks. Special care was used to protect pipe in rocky countr including padding of the bottom of ditch, protection along side during lowering-in and careful sifting of soil during backfil

Welders in the bell hole complete a pass on the 34-inch, 0.469-inch X-52 pipe. Specifications were strict; they required a minimum of pipe handling. Field welds were capped by five crews of two welders each.

Field joints were protected with flood coating of coal t enamel and a cigarette wrapper form of asbestos felt. Wid of ditch was normally 46 inches; cover was 30 inches exc in rocky country where at times specifications permitted co to be reduced to 24 inches.

Dredging progresses in preparation for pulling the first underwater gas line crossing of the Colorado River near Needles. Pulling winch is anchored on top of west bank; pipe string was welded up on Arizona side of the river. Dredge made 14-foot ditch in the river bottom.

First 24-inch crossing of the Colorado is completed as the lead end of the pipe reached the California side of the river. Pipe with corrosion protection coating and concrete weight, weighed 370 pounds per foot. Dual 24-inch, 1,458-foot crossings were pulled some 500 feet apart.

siderations providing for an ultimate capacity of 600,000 Mcf daily.

Stringing with Fork Truck. The 80-foot joints of yard-coated pipe received extra special care in stringing along the right of way. Loaded on rubber padded truck racks which hauled three joints per run, the pipe was strung with fork lift trucks using a padded clamp to pick up the pipe and lay it down. The maneuverable rubber tired lift trucks sped stringing operations.

Surveying and Right of Way Work. Initial route survey of the line was accomplished by aircraft and final alignment by helicopter. A radar like device, which measures a course by determining time for a radio signal to travel over the course, was used on the traverse and route survey. The traverse was surveyed for the entire pipe line in three days with this equipment.

Rippers were used on much of the 116-mile right of way; in several areas comparatively deep cuts were made by dozing and cutting a bench for the pipe line ditch. Some blasting was required and special ditching problems were created where the line intersected beds of lava flow. Ditch was cut to provide a depth of cover of 30 inches with a minimum depth of cover in rocky areas of not less than 24-inches.

Special Backfilling. Extra care was used in protecting pipe coating on the new PLGS line. Specifications call for the bottom of the trench to be padded for its entire length with a cushion of fine material 4-inches in depth where rock conditions required it. In addition specially constructed backfill sifters were used to screen out rocks and heavier material from the spoil bank and fines were used to shade the pipe line. Two different modifications of shaders were devised for the work: a large rubber belt conveyor shader supplied by a front end loader produced reasonably satisfactory results. Biggest problem was that of maintaining the rubber belt loader in areas where large rocks were encountered. In many areas front end loaders were used to backfill the line, with selected material from the spoil bank being placed in the ditch first.

Field joint protection was made with quick fitting forms flooded with coal tar enamel. PLGS engineers cite the cathodic protection record on an 80-mile 34-inch line constructed in 1958 over a mountain range where the same special care was used in protecting pipe coating; the entire 80 miles of line is now under cathodic protection with a total current drainage of 2.7 amperes.

Suppliers of the chief components that went into construction of the 116-mile, 34-inch pipe line of Pacific Lighting Gas Supply Co. were:

Pipe—Kaiser Steel Corp.
Coal tar enamel—Koppers, Inc.
Valves—Rockwell Manufacturing Co.
Grove Valve and Regulator Co.
Meter runs—Daniel Orifice Fitting Co.
Field Joints—Protecto Wrap.

Principal Contractors for the pipe line project:

Construction of the pipe line—Pacific Pipeline Construction Co. and Engineers Limited Pipeline Co., a joint venture.
Colorado River crossing—Missouri Valley Dredging Co.
Stringing—Contractors Cargo Co.
Wrapping and double jointing—Pacific Pipeline Construction Co.

Colorado River Crossing. The Pacific Lighting Gas Supply—Transwestern crossing of the Colorado River is the first underwater crossing of that river for a major gas pipe line. Previous gas lines have crossed the river overhead; however, the Four Corners Pipe Line crude line crosses the Colorado in this area.

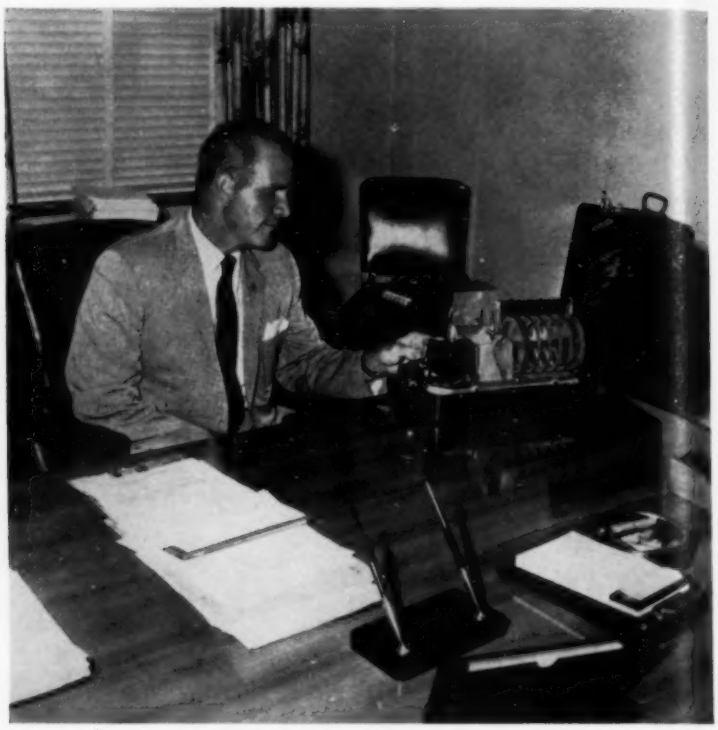
Missouri Valley Dredging Co. completed this dual 24-inch pipe line crossing about five miles upstream from Needles, Calif. The 1,458 foot crossing was made with lines buried in the river bottom some 500-feet apart. Depth of water at this point is 15 to 20 feet. Ditch for the pipe was dredged 14 feet into the bottom.

At the crossing location there is a swift current through most of the sweep of the river; broken rock is found on the bottom of the river near the banks. The river line when provided with protective coating and concrete weight coating weighed 370 pounds per running foot. After completion of construction July 20 on the 116-mile PLGS line, the system is now ready to start taking gas from Transwestern Pipeline Co.

ACKNOWLEDGMENT

PIPE LINE INDUSTRY editors greatly appreciate the assistance of Pacific Lighting Gas Supply Company, Pacific Pipeline Construction Company, and Engineers Limited Pipeline Company and cooperation of their personnel on our tour of the pipe line facilities during construction of the line. Special thanks to Maurice E. Fuller, chief engineer; Frank Whipple, project engineer; Marcus Buckland, project superintendent, and Steve Baer, Pacific Lighting Gas Supply Company, and Lee Erlewine, superintendent, Engineers Limited Pipeline Company.

L. J. Schwartzkopf, Marathon Pipeline Company communications technician, who devised the "talking brain" installs one of the units at the Lima, Ohio, pump station. The unit audibly reads flowmeter over microwave or telephone circuit after receiving inquiry from dispatcher via ordinary telephone call. The device weighs 26 pounds and can be installed in two hours.



Marathon president, J. H. Rice, inspects DATA unit (Digital to Audio Translator Accumulator). The cost of the device is small compared with other equipment designed to do similar job. Chief advantage is that it requires no involved circuitry to prevent false readings.

'Talking Brain' Answers Phone, Reports Meter Reading

Dispatchers in Marathon's home office dial a number and listen as electronic answering service reports from pump station 400 miles away

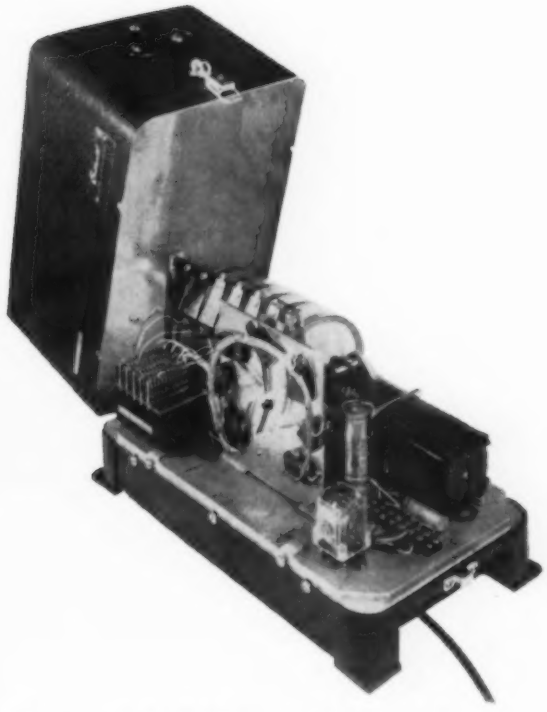
A "TALKING BRAIN" similar to the pre-recorded telephone answering service is reporting meter readings from a pump station to dispatchers in Marathon Pipeline Company's home office 400 miles away. The dispatcher simply dials a number then listens as the device announces the name of the station and gives the readings on the flow meter.

Surprisingly, the cost of the equipment is low and it can be installed at the average station in about two hours.

In one instance, this electro-mechanical "talking brain" is reducing from hours to seconds the time formerly required for Marathon employes to check readings on flow meters at a remotely located pump station. What's more, it is doing the job more accurately than human reporters.

Developed by technicians of the Marathon Pipeline Company, a subsidiary of The Ohio Oil Company, Findlay, Ohio, the device does in 16 to 25 seconds a job with less error margin than a man was able to do by driving a round-trip of 14 miles every two hours for his flowmeter check.

Pump station foreman, E. D. Paul, compares Lima station flowmeter readings with DATA figures. Unit does in 25 seconds the job that would require a 14-mile round-trip by a man every two hours—and with less error margin.



Close-up of the DATA unit. Pre-recorded messages and numbers are red into phone when the unit is actuated. The successive series of revolutions of the drum actuates the proper playback heads attached electronically to the various contacts of a digital counter.

Dispatchers in the company's general office at Findlay simply dial their telephone and ring the device (referred to as a Digital-to-Audio-Translator-Accumulator) which answers automatically. The pumping station identifies itself through a pre-recorded tape attached to a drum which begins to rotate at the telephone signal.

The successive series of revolutions of the drum actuates the proper playback heads, attached electronically to the various contacts of a digital counter, to read out the numbers from the respective tapes attached to the drum. This station identification and digital read out actually is a pre-recorded human voice speaking the words and numbers clearly over telephone lines or microwave systems.

The company now has two installations at pumping stations as far away as 400 miles and plans to install more by the end of the year. Within a few years, Marathon expects to have over one hundred in use along its 5,600 miles of wholly owned and partly owned pipe lines in 11 states, upon which the company depends for transportation of its crude oil and refined products.

J. H. Rice, president of the Ohio Oil pipe line subsidiary, pointed out that the DATA device has proved to be the most reliable method yet found to relay pumping station flowmeter readings to the dispatching office. One unit in operation in a station near Alton, Ill., reported the flow of 2,700,000 barrels of oil with only a seven-barrel error over a five-month period.

Rice pointed out that his company's cost for materials in developing the device was only $540, and that a manufacturer plans to market them for about $1,300 each. In comparison, he said that another type electronic reporting device now used by the company, costs about $5,000 per unit, requires frequent maintenance and has a considerably greater margin of error. Chief maintenance of the DATA unit, Rice explained, is the periodic replacement of tubes in the associated amplifier which may function for several years.

The DATA instrument, ordinarily operated by alternating current electric power, is also equipped with dry cell batteries and an accessory relay in case of power failure. The batteries would pulse the counter during a power loss.

L. J. Schwartzkopf, company pipe line communications technician, developed the idea for the device after months of hearing pipe line personnel decry the problems of visually reading the flowmeters and the maintenance and unreliability of other types of automatic reporting machines.

DATA weighs about 26 pounds and can be installed at a pumping station in about two hours. The company can utilize both telephone and microwave communication systems for transmitting.

Continental Technical Service, Inc., of Dayton, Ohio, was called in by Ohio Oil and Marathon to package and make mechanical refinements to the instrument. **—The End**

Pipe Line Pete's

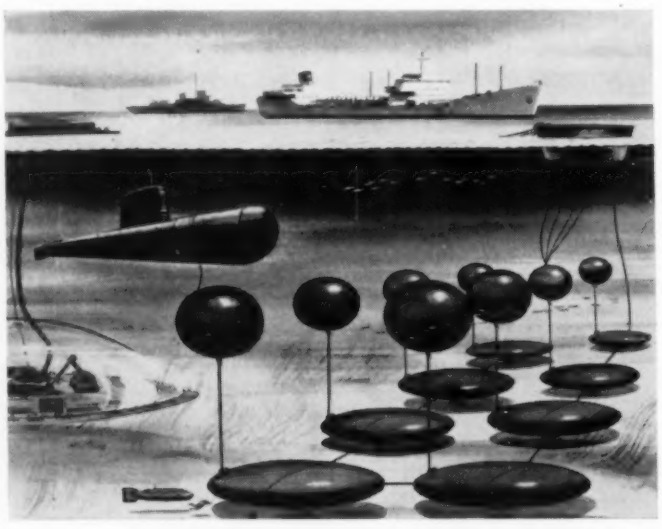
IDEAS FOR THE FUTURE!

. . . in pipe line engineering, construction and operations

By Donald M. Taylor, Engineering Editor

Look What's Going on in the Sea

Scientists say that in the future we'll be farming the sea—growing unlimited supplies of protein so no one in the world need go hungry. Too, we'll be mining the sea



—for dissolved in its waters are virtually every known mineral.

Recently, the U.S. Navy displayed a tracked vehicle which will operate on the ocean floor at depths of several thousand feet. The tractor can be remotely controlled from the surface. It has robot arms which can be used to pick up geological specimens and four TV cameras so the operator can see what's going on.

The oil industry is dreaming of undersea drilling rigs, and has developed equipment and techniques for completing undersea oil and gas wells.

Recently, work was started on an experimental underwater storage system near St. Petersburg, Fla. in the Gulf of Mexico. It consists of a series of interconnected nylon-reinforced synthetic rubber tanks which can be used for storage of fuel, water, food, and medical supplies. The tanks have a saucer-like shape and are semi-cylindrical in shape. When filled they measure 14 by 23 feet in cross section.

The tanks were made by The Firestone Tire & Rubber Co. for The Jet Fuel & Storage Co. and were installed by the Global Marine & Exploration Co. Capacity of each tank is 10,000 gallons, but it is now possible to make tanks with far greater capacity according to Raymond C. Firestone, president of the rubber firm.

The tanks are light enough to be ferried by air and they anchor to the ocean floor by means of a special bored anchor and swiveled connection.

A second and somewhat similar underwater storage test is being conducted by the U.S. Navy and Hanna Construction Co. in the 52-feet-deep water in the Grand Isle oil field off the Louisiana coast. A prototype tank made by U.S. Rubber holds about 50,000 gallons of fuel. The 22-ft x 70-ft tank is held to the bottom by tubular steel frame and nylon harness.

Radiation Used in Manufacturing Methane From Coal

For years scientists have been trying to develop an economical method of manufacturing methane gas from coal. A new method which holds promise has been developed by Columbia University scientists. Coal char, produced by heating coal to drive off volatile fractions, is irradiated by Cobalt-60 while held at a temperature of 1,200 F and about 5,000 psi. Up to 50 percent of the char has been converted to methane and other hydrocarbons.

This research is sponsored by Consolidated Natural Gas Co.

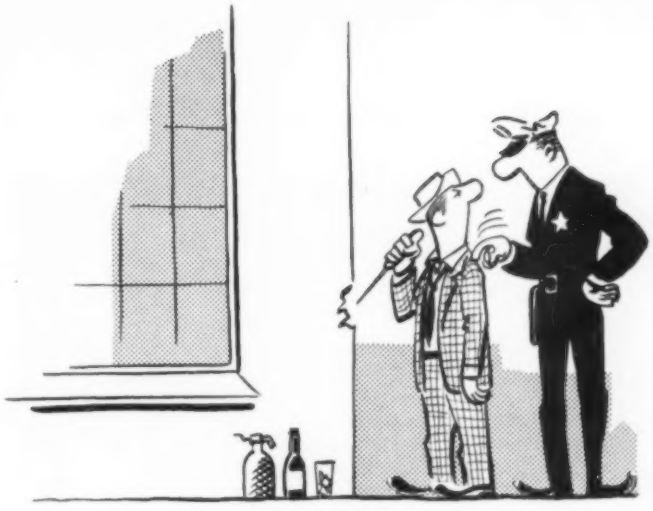
Using Ice as Material for Homes, Buildings, etc.

Add sawdust—15 percent by volume—to ice and you increase its tensile strength some 300 percent. Add 4 percent fiber glass and the increase is 1,000 percent. These are but two of the facts researchers at MIT's ice laboratory are finding out about ice.

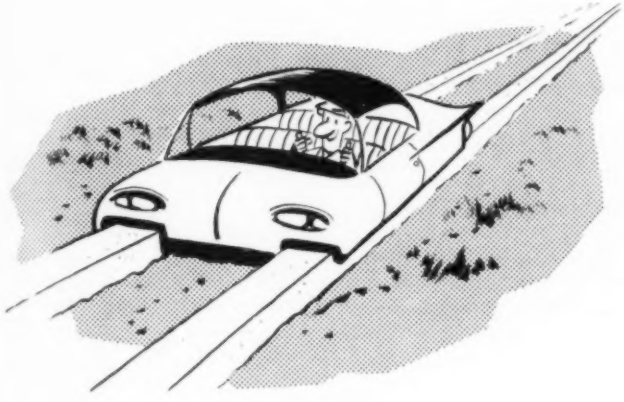
By adding alcohols, lubricating oils you can make a denser and stronger ice. Pressure, too, has a great effect on density and grain structure.

In the far north where we are building airport runways of ice, the thickness of pure ice must be 50 to 75 inches thick. Addition of glass fibers reduces the necessary thickness to about six inches.

Who knows, maybe we will one day have ice building —even in the sunny south. Insulating materials are now good enough to preserve an igloo for a hundred years, almost. Why quick-frozen homes and office building may not be far off.



Levacars Will Travel on Air at 500 MPH Speed



Ford Motor Co. spokesmen predict that in the not too distant future we will have 500 mph "levacars" which will travel on a thin film of compressed air. The automobile manufacturer has already built several experimental models of the new vehicle.

In operation, levacars carrying a number of passengers, are mounted on flat-topped tracks, similar to railroad tracks. A stream of compressed air squirted out of "levapads" elevates the vehicle a fraction of an inch above the tracks. An aircraft engine provides the forward push.

Alex Haynes and David Jay of Ford told the American Society of Mechanical Engineers meeting in Dallas that such vehicles will supply the answer for relatively short inter-city trips. The units will travel on rails similar to railroad tracks, and in case of failure of compressed air, the craft will slide safely to a stop.

Power consumption and cost of operation should be far less than that of aircraft according to the Ford spokesmen.

Converting Salt Water Cheaply

For 30 to 50 cents per 1,000 gallons you can convert salt or brackish water to drinkable water. This holds great promise for such arid regions as West Texas where there are copious supplies of underground water—too brackish for normal use. H. R. Drew, director of research for the Texas Electric Service Co. described the development of a new method of treatment to a meeting of ASME in Dallas. The process is known as electrodialysis, and it can be described simply as placing permeable membranes in water between electrodes. Current causes salt to move toward one electrode, and the membrane prevents it from moving back. Thus one stream of water loses salt, while another picks it up and becomes more concentrated.

Camera for Photodrawings

A new camera developed by Procter & Gamble is turning out photodrawings for its engineering department. The chief advantage of the camera is that it eliminates perspective, producing only an ortho projection of the model it photographs. It does this by eliminating all but parallel rays that come from a scale model of a proposed engineering structure.

A 22-inch parabolic mirror focuses rays from model on extremely small aperture (equivalent to about *f*-500). Once through the aperture the rays of light pass through correcting lens and are re-imaged on the film plane. The negatives are assembled on layout sheet and a polyester sheet film positive is made. From this come reproducible diazo prints.

How to do it

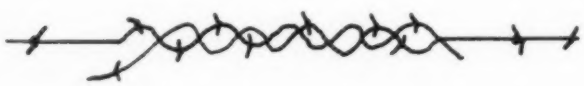
PIPE LINE HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas

Cylinder Heads Handled Easily with Tiltable Racks

Racks made out of angle iron with a triangular pattern throughout, make it possible to handle heavy cylinder heads during repairs with little difficulty.

A "C" clamp with a spindle on it can be bolted to either side of the head. The spindles fit in the "bearing" made of 1½-inch pipe. This enables repairmen to turn the heads so either side can be worked. As shown here, the racks were made up to hold all the cylinder heads from one engine.



Old Style Splice

Clip

Bolt Lids Under Shelves To Make Small-Item Holder

Anything to make maintenance easier. At most stations there are times when nothing much is doing in the way of repairs, and this is the time to get ready for the fast and furious pace which usually accompanies the annual overhaul.

As shown here, repairmen bolted jar lids to the under side of shelves in the shop; then, carefully labeled the jars and filled them with small bolts, nuts, washers, etc. that are sometimes difficult to find when you are in a rush.

Clips Improve Repair Job When Splicing Wire Fence

Cutting a gap in a good barbed wire fence has rarely been known to improve it and a sloppy repair job has been known to impair company land-owner relations. In fact, one pipe line company has made the practice of giving aluminum gates to land owners to overcome the difficulties caused by installing necessary gaps during construction.

One way to improve the fence repairs is to use metal clips when making splices. This beats the heck out of the old twist-wire method. The clips are neat, have a great holding power and can be installed with a high speed tool.

Chilled Valve Guides Are Easier to Install

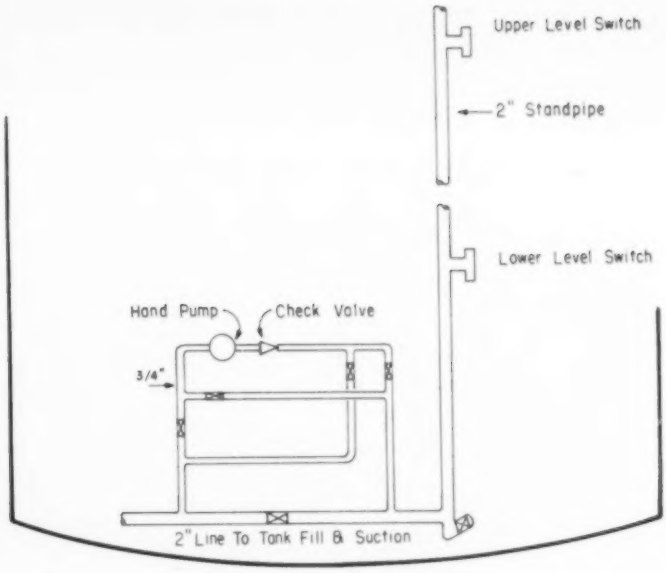
Repairmen at one compressor station make it a habit of storing at least one set of valve guides in the refrigerator right along with soda pop so they will be cold and easier to install in the snug fitting head. The result, they can be installed with light tapping.

Portable Pump Improves Valve Testing in Overhaul

To check valves, heat exchangers and other equipment during overhaul, a portable pump for hydrostatic tests can be rigged easily.

One company using such a unit for hydrostatic tests used an air-operated hydro-pneumatic pump rated at 7,330 psi and mounted it on a rubber-tired cart for mobility. Operated by 90 psi air, the pump furnishes pressures ranging from 250 to 2,500 pounds.

With valves mounted on test stand and portable pump connected to it; application of hydrostatic pressure spots leaky valves which need to be repaired or replaced. Since it is air-operated, pressure is built-up to required level quickly and a number of valves can be checked at one time.



Piping Arrangement Allows Level Switch Check by Pump

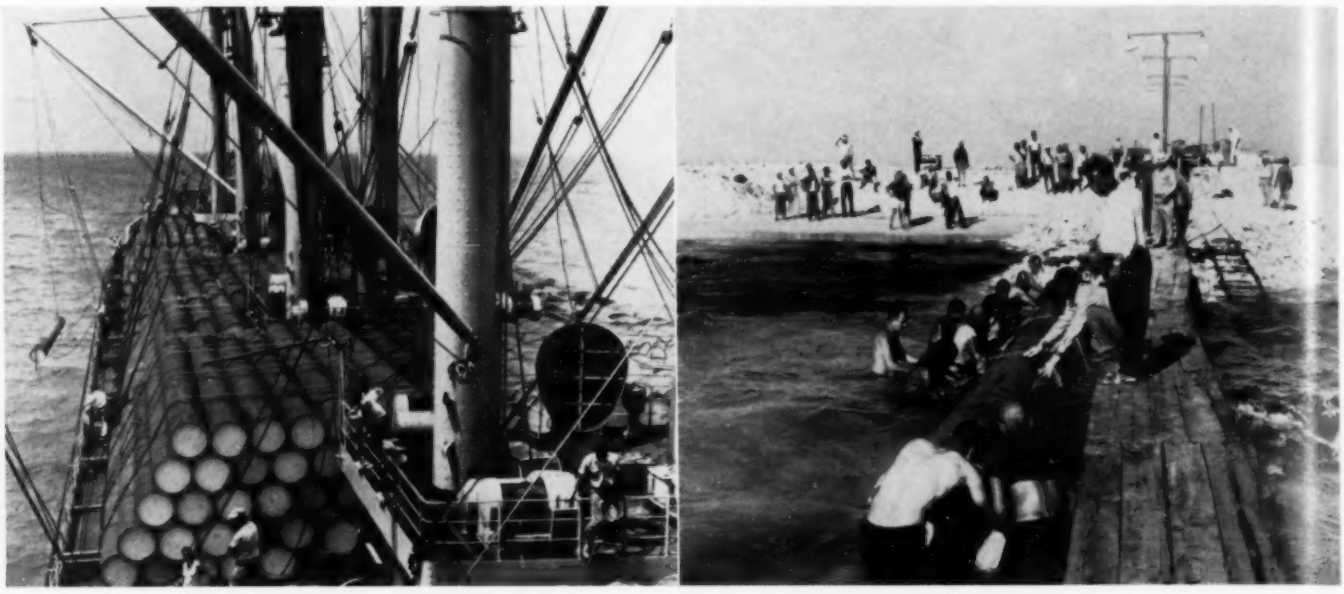
Use some version of the piping arrangement shown in the accompanying drawing, and you will be able to check the level switches on a tank without having the bother of disposing of the oil from the standpipe after the test has been completed.

In making a test, you first pump the standpipe below the bottom level switch, checking on its actuation. Then the manifold is valved so the pump can be used to fill the standpipe, checking on the upper switch. The oil is then allowed to equalize with that in the tank.

Photograph Courtesy Aldrich Pump Company.

WHAT'S HAPPENING IN PIPE LINE CONSTRUCTION

By Donald G. DePugh, Construction Editor



Floating Pipe From Ship to Shore

Since there are no unloading docks at Marsa El Brega, Libya, on the Gulf of Sirte, Esso Standard (Libya) Inc., is unloading 40-foot joints of 30-inch pipe a mile offshore and floating it to dry land. George A. McCammon, project engineer, devised the plan using plastic plugs in ends of pipe to keep it afloat. At left, first of 2,000 joints on this ship is lowered into sea. Pipe is towed by small boats and chained to special car on marine railway by Libyan crews, right. Rough seas made operations difficult. SAASCAM, Libyan contractor, is unloading the pipe. Libya's first crude line will extend 100 miles south to the Zelten field in the desert.

Colorado Interstate-El Paso Project Receives FPC Examiner Authorization

A Federal Power Commission examiner has given his approval for the Colorado Interstate-El Paso Natural Gas $150 million project to deliver 400 MMcf of gas daily to California.

Emery J. Woodall authorized the project, which is still subject to approval of the full commission, while California fuel-oil dealers registered objections.

The plans include a 395-mile, 34-inch line from Provo, Utah to near Las Vegas, Nevada at the California border which will be built by El Paso Natural Gas Company. Colorado Interstate Gas Company would lay 476 miles of 26-34-inch line from the Texas Panhandle to Denver and 155 miles of 34-inch from Rock Springs, Wyo. to Provo.

Colorado will supply 200 MMcf of gas daily from its Texas source and take 200 MMcf from El Paso's Pacific Northwest Division. An additional 150 MMcf would come from Canadian exports through Westcoast's system into the Pacific Northwest Division.

Southern California Gas Co. and Southern Counties Gas Co. will receive the gas at California's border for delivery to the Los Angeles area. Southern California and Southern Counties will construct a 93-mile, 34-inch line from the border to Newberry, where it will tie in with its system.

Construction would be completed in the fall of 1961.

Westcoast Transmission Plans to Loop Entire Line

Westcoast Transmission Company Limited plans to loop its entire 688-mile, 30-inch gas line from Peace River area of British Columbia-Alberta to the United States border.

The loop line will allow Westcoast to take the additional gas recently discovered in Fort Nelson district of northeastern British Columbia. Plans already have been announced for construction of a 250-mile, 30-inch line to transport gas from Fort Nelson to Westcoast's system. Gas Trunk Line of British Columbia Ltd., has been formed by Westcoast and several producing companies to lay the new main line which will have an initial capacity of 350 MMcf daily. Ultimate capacity is estimated at 650 MMcf.

The project is scheduled for start in 1961 and completion before the end of that year.

Peace River Withdraws Permit to Lay Crude Lines

Peace River Oil Pipe Line (B. C.) Ltd. has withdrawn its permit from the British Columbia government for construction of 230-mile system in northeastern section of the Province.

The company surrendered its permit because "normal financing of the multi-million dollar project has proved impossible because of conditions which the British Columbia government attached to the permit for the building of the pipe line."

Yellowstone Lets Contract On 85-Mile Products Line

R. H. Fulton and Company has been awarded a contract by Yellowstone Pipe Line Company to lay an 85-mile, 6-inch, products pipe line from Helena to Great Falls, Mont.

Latex Construction Co. Awarded Two Contracts

Plantation Pipe Line Company has awarded Latex Construction Co. a contract to lay 73 miles of 8-inch products pipe line to replace a 4-inch section between Helena and Montgomery, Ala. Latex also will take up the 4-inch existing line.

Commonwealth Natural Gas Company has awarded a contract to construct a 28-mile, 18-inch line in Virginia.

Central Illinois Light Co. Lets Contract on 53 Miles

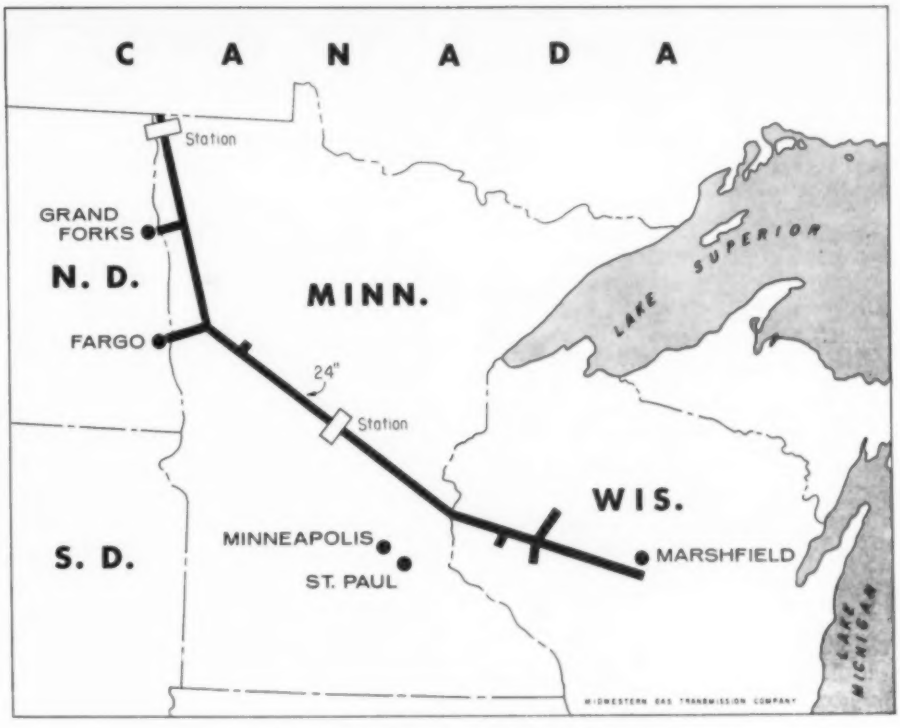
Somerville-Illinois Company has been awarded a contract by Central Illinois Light Company to construct about 53 miles of 24-30-inch gas transmission lines in Peoria, Tazewell and Marshall counties, Illinois.

Kenai Lets Contract On Alaska Pipe Line

Kenai Pipe Line Company has awarded a contract to Sharman, Allen Gay & Taylor, Inc., for construction of its 20-mile, 8-inch crude line from Mikiski Terminal to Swanson River Unit near Kenai, Alaska.

Transco Lets Contract To Fulghum Contracting

Transcontinental Gas Pipe Line Corporation has awarded a contract to Fulghum Contracting Corporation for construction of approximately 18 miles of 20-inch in Delaware County, Pa. and Gloucester County, N. J.



Route of Midwestern's 24-inch Line.

Midwestern Gas Transmission Lets Contracts on 504-Mile, 24-Inch Line

Six main line contractors have begun work on construction of Midwestern Gas Transmission Company's 504-mile, 24-inch gas line from Minnesota-Canadian border south of Winnipeg to Marshfield, Wis.

Contractors and their spreads include: Bechtel Corporation, 155 miles from Canadian border to the Becker County-Clay County line in Minnesota; Grayco Constructors, Inc., 54 miles from Becker-Clay County line to near New York Mills, Minn; H. C. Price Company, 56 miles from New York Mills to the Mississippi River; Houston Contracting Company, 109 miles, Mississippi River to Wanderoos, Wis; Contracting and Material Company, 54 miles, Wanderoos to the Chippewa River; and Panama, Inc., 66 miles from Chippewa River to Marshfield, Wis.

Contracts for lateral lines were let to Texas Pipeline Construction, Inc., 16 miles, and to Bristow-Hyde Engineering Corporation, 39 miles. River crossings contracts include Popich-Marine Construction Company, the Mississippi; Pentzien, Inc., the St. Croix; and Missouri Valley Dredging Company, the Chippewa.

The $52 million project is scheduled for completion by November. Trans-Canada Pipe Lines Limited, which will supply Midwestern with the gas, will lay a 50-mile, 30-inch lateral from its main line to the border where Midwestern's line starts.

Midwestern also has awarded contracts for internal coating and double jointing of the main line. Stanley Bledsoe and Rosson Richards will internally coat about 255 miles and H. C. Price is double jointing 150 miles of the pipe.

Houston Contracting Company is building the two compressor stations on the line.

Pemex-TGT Considering 34-Inch Line

Tennessee Gas Transmission Company and Petroleos Mexicanos, are negotiating over the possibilities of constructing a 1,240-mile, 34-inch gas pipe line from Reynosa, Mexico, to San Luis Rio, Colorado, which is on the Mexico-California border.

The line would carry Texas and Mexican gas to California where it would be purchased by Southern California Edison Co. for use in power generation in the Los Angeles area. It would also serve gas for western Mexico.

Pascual Roldan of Pemex has said that an initial working agreement with TGT for preliminary negotiations has been signed. Tennessee Gas spokesman confirmed that the company is negotiating with Pemex, as indicated by Roldan's statement. But he added, that any further clarification no doubt will come from Pemex officials.

Although no plans for financing and construction has been arranged, it is thought that Pemex would finance the line and construct it with Tennessee Gas aiding in design and supervising the construction of the line.

Early estimates of the project set the cost at about $160 million and the ultimate capacity of the line would be around 750 MMcf.

Contracts Let on $75 Million Project By NGPL and Peoples Gulf Coast Pipeline

Natural Gas Pipeline Company and Peoples Gulf Coast Pipeline Company have awarded contracts on their recently approved $75 million construction projects.

Natural Gas Pipeline let contracts to R. H. Fulton & Company for construction of 188 miles of 24-inch main line from Weatherford, Okla. to Ashland, Kan. Other NGPL spreads include 95 miles of 36-inch loop lines in Iowa to be laid by River Construction Corporation and 58 miles of 36-inch loops in the vicinity of Concordia and Ford, Kan., which will be built by O. R. Burden Construction Corporation.

Peoples Gulf Coast let contracts to six contractors for construction of 370 miles of 30-inch loops between Texas and Illinois. Contractors and spreads include O. R. Burden, 37 miles in Wharton County, Texas; Panama-Williams Corporation, 60 miles, between Nacogdoches and Leggett, Texas; Sharman, Allen, Gay & Taylor, Inc., 60 miles, in Texas and Arkansas; River Construction Corporation, 74 miles in Arkansas; H. C. Price Company, 83 miles, in Missouri and Illinois; and Stanley-Bledsoe Corporation, 57 miles, in Shelby County, Ill., north through Moultrie County to a point of tie-in to the main line, Piatt County, Ill.

Pentzien, Inc., has been awarded a contract to lay a dual 30-inch crossing of the Missouri River near Plattsmouth, Neb. for Natural Gas Pipeline Company.

Construction Underway on 640 Miles of Loops and Laterals for Northern Natural

Northern Natural Gas Company has let contracts on 640 miles of 3 to 30-inch of main line loops and branch laterals. The company has also awarded contracts on construction on 18,000 hp in new and additional stations.

Panama-Williams Corporation will construct 113 miles of 24 and 30-inch loops along its main line. C. S. LeNoir Construction Company will lay 133 miles of 4-16-inch laterals in Minnesota; Pipeline Welding Company has 162 miles of 3 to 12-inch laterals in Minnesota; Prairie Construction Co., will build 114 miles of 2-12-inch in Iowa; R. E. Reutzel Company will construct 89 miles of 2-6-inch and Underground Constructors has 28 miles of 2-12-inch in Iowa.

The 107 miles of 24-30-inch is being internally coated at the pipe mill and Northwest Pipe Coating, Inc., has contract to internally coat the 133 miles of 4-16-inch laterals in Minnesota. A small portion of the 24-inch will be coated by contractor.

A new 4,000 hp station will be built at Waterloo, Iowa by Foor Engineering Company. Other station construction includes 6,800 hp addition at Oakland, Iowa, by Dresser Engineering Co.; 2,000 hp addition at Palmyra, Neb., by Dresser; 4,000 hp addition at Mullinville, Kan., by R. L. Frailey, Inc.; and a 2,000 hp addition at Beaver, Okla., by Panama-Williams Corporation.

Argentina Plans 1,000-Mile Gas Line

Argentina's government oil agency YPF has announced it is considering construction of another major gas transmission line into Buenos Aires. Last year the country's first cross-country line was completed from Campo Duran to Buenos Aires.

YPF has invited major companies from United States and other nations to "qualify" as being able to build the system in a turn-key job. Texas Eastern Transmission Corporation has confirmed a report that it has been asked to qualify and that qualifications must be submitted by August 15.

Texas Eastern and other companies, including Italy's ENI, were requested to prepare proposals for the design, construction and financing of the 1,000-mile line to run from Comodoro Rivadavia to Buenos Aires.

After initial bids have been received this month, final bids for construction of the line must be presented by November 4.

It is estimated that the line would cost approximately $300 million and be 30 inches in diameter, but this can not be determined before the complete bids on the entire project have been made and accepted.

H. C. Price Co. Awarded Contract by Rocky Mountain

H. C. Price Company will construct approximately 172 miles of gas pipe line and distribution lines ranging from 2 to 8-inch in Mesa, Delta and Montrose counties, Colorado. The lines will be laid for Rocky Mountain Natural Gas Company.

McVean & Barlow Awarded Portion of Mid-America

Williams Brothers Company has sublet a portion of its Mid-America Pipe Line Company project to McVean & Barlow. The latter company will lay 231 miles of 4, 6 and 8-inch pipe from Artesia, N. M. to Midkiff, Texas, south of Midland.

Williams Brothers has completed 541 miles of the 1,800 mile LPG line. The company also has completed 86 miles of the 240-mile, 8-inch products pipe line being laid in Iran for the National Iranian Oil Company.

A contract has been awarded to Williams Brothers for construction of a 43-mile, 24-inch, line for Transok Pipe Line Company. The line will extend from Oolagah to Jenks, Okla.

BP Trading Invites Bids For Steel on Offshore Line

BP Trading Ltd., has invited bids for supplying steel pipe for construction of the submarine crude line in the Persian Gulf. The 20-mile, 18-inch crude line will extend from the Umm Shaif underwater oil field to Das Island. The line will be built and operated by Abu Dhabi Marine Areas Ltd. which is owned two-thirds by BP and one-third by Compagnie Francaise des Petroles.

Cost of the pipe itself is estimated to be about $1.4 million.

Texas Southwestern Gas Corp. Proposes 100-Mile Gas Line

Plans have been made by Texas Southwestern Gas Corp. for a 100-mile gas pipe line from Coleman to Jack County, Texas. The $30 million project would include a 100 MMcf per day processing plant.

PROPOSED PIPE LINE CONSTRUCTION

Here in convenient summary form is Pipe Line Industry's listing of company, line size, length, service, location and project status.

U. S.

Algonquin Gas Transmission Co., Boston, 25 miles, 20-inch; 8 miles, 8-inch, gas, and 12,000 hp addition in Massachusetts, $6 million, before FPC.

Anchorage Gas Corp., Houston, 165 miles, 12-inch, gas, Kenai to Anchorage, Alaska, $15 million, contracts let to **Williams Brothers Co.** and **Sharman, Allen, Gay, & Taylor.**

Arkansas Louisiana Gas Company, Shreveport, La., 58 miles, 2-6-inch, gas, planned.

Aztec Pipe Line Company, 36 miles, jet fuel line, Artesia to Walker Air Force Base near Roswell, N. M., contract let to **Brodie Construction Co.**

Belle Fourche Pipeline Co., Casper, Wyo., 103 miles, 8-inch, crude, Fiddler Creek field to Lance Creek, Wyo., and branch lines from North Donkey Creek field to Rozet and Miller Creek fields, $2¾ million, before Wyoming Public Service Commission.

Buckeye Pipe Line Co., New York, 54 miles, 16-22-inch, crude, main lines from Toledo to Samaria, and Detroit, Mich., $4 million, contract let on 41 miles of 16- and 22-inch to **Panama Williams Corp.** and **Somerville Construction Co.**

Carolina Pipeline Company, Columbia, S. C., 85 miles, 8-inch, gas, in South Carolina, $5 million, before FPC.

Central Illinois Light Company, 53 miles, 24-30-inch, gas, Peoria, Tazwell and Marshall counties, Ill., contract let to **Somerville-Illinois Co.**

Coastal States Gas Producing Co., Corpus Christi, Texas, 60 miles, 10-inch, gas, gathering, La Salle and Frio counties, Texas, before FPC.

60 miles, small diameter, gas gathering line, to tie in with system under construction and extend to Pearsall County, Texas, planned.

25 miles, gas, Associated Gas & Oil Co. field to South-Tex Corp., processing plant west of Corpus Christi, Texas, planned.

37 miles, gas gathering in Brown, Eastland, Comanche and Erath counties, Texas, planned.

Coastal Transmission Corp., Houston, 81 miles, 3 to 10-inch, gas, laterals; 5,500 hp in stations at Port Lavaca, Texas, and Eunice, La., and additional 1,500 hp at Robstown, Texas, $6.2 million, before FPC.

Colorado Interstate Gas Co., Colorado Springs, 140 miles, 34-inch, gas, Green River, Wyo.,-to-Provo, Utah; 109 miles, 26-inch, Texas Panhandle to southeastern Colo., 136 miles, 34-inch, southeastern Colorado-to-Pueblo, Colo.; 107 miles, 30-inch, Pueblo-to-Denver, $91 million, FPC examiner approval.

Colorado Oil & Gas Corp., Denver, 400-miles, gas, from Gubik field to Fairbanks, Alaska, planned.

Columbia Gulf Transmission Co., Houston, 12.8 miles, 6 and 20-inch, gas, loop line in Louisiana, $730,000, authorized.

Continental Pipe Line Co. (joint venture with Husky Oil Co.), Ponca City, Okla., 85 miles, 6-inch, products, Helena to Great Falls, Mont., contract let to **R. H. Fulton & Co.**

East Coast Pipeline Co., 90 miles, 12- to 24-inch, products, Linden, N. J. to Suffolk County, N. Y., $25 million, planned.

El Paso Gas Supply Company, El Paso, Texas, 228 miles, 30-inch, gas, main, Live Oak to Sutton County, Texas, $30 million, planned.

El Paso Natural Gas Company, El Paso, 199 miles, 30-inch, Permian-San Juan crossover loop, before FPC.

17 miles, from Pacific Gas Transmission Co. facilities to near Spokane, Wash., before FPC.

34 miles, 20-inch, Puckett to Goldsmith, before FPC.

23 miles, 20-inch, Goldsmith to Eunice-Plains line, before FPC.

9 miles, 20-inch, Goldsmith-Plains loop, before FPC.

43,600 hp in new and existing stations in Texas, Oklahoma, New Mexico and Utah, before FPC.

400 miles, 34-inch, Salt Lake City, Utah, to California border, FPC examiner approval.

El Paso Natural Gas Products Company and **El Paso Products Pipeline Co.**, 32 miles, 6-inch, crude, from Patrick Draw Oil and Gas Field to Wamsutter, Sweetwater County, Wyoming, before Public Service Commission.

Equitable Gas Company, Pittsburgh, Penn., 31 miles, 16-inch, and 26 miles, 20-inch, in West Virginia and Pennsylvania, $5 million, before FPC.

Goliad Corp., Houston (Joint venture with **Union Oil Co. of Calif.**), 85 miles, LPG, Kaplan, La. to Baton Rouge, extraction plant at Kaplan and fractionation plant at Baton Rouge, $12 million, planned.

Great Northern Railway, St. Paul., 110 miles, crude, fields in Burke and Bottineau counties to Minot, N. D., $3½ million, Public Service Commission authorization.

Hope Natural Gas Co., Clarksburg, W. Va., 45 miles, gas, from West Virginia to Pittsburgh area, planned, 20 miles, 24-inch, gas, in Wertzel and Monongalia counties, W. Va., authorized.

Houston Texas Gas & Oil Corp., St. Petersburg, Fla., 199 miles, 2 to 6-inch, gas, laterals; 20,000 hp in five new stations; $12 million, before FPC.

Humble Pipe Line Company, Houston, 63 miles, 8-inch, crude, and gathering system Sacatosa field, Maverick County to Pearsall, Texas, contract let to S. H. Shanks & Sons.

Iron Ranges Natural Gas Co., 115 miles, gas, from Itasca and St. Louis counties along route of Mesabi range from Grand Rapids to Aurora, Minn., $5 million, FPC authorization.

60 miles from Duluth to Silver Bay, Minn., FPC authorization.

Kansas-Nebraska Natural Gas Company, Hastings, Neb., 165 miles, 2-8-inch, gas, extension from Alliance, Neb., to Chadron, Crawford, Hemingford, Hay Springs, Gordon and Rushville, Neb., before FPC.

45 miles, 2-3-inch, gas, in Kansas, approved by Kansas Corporation Commission.

2,000 hp addition at Scott City, Kan., FPC approval authorization.

2,500 hp addition at Holcomb, Kan., before FPC.

Laclede Gas Co., St. Louis, 107 miles, 24-inch, gas, Hallsville to St. Louis, Mo., planned.

Manufacturers Light and Heat Company, Pittsburgh, 103 miles, 20-inch, gas, in Franklin, Adams, Fayette, Green, Fulton and Somerset counties, Pa., $7 million, contract let on 70 miles to Williams Bros. Co.

Matador Pipe Line Corp., Denver. 175 miles, crude, from Bottineau, Burke and Renville counties, N. D., to Cromer, Man., Canada, $4 million, proposed.

Michigan Wisconsin Pipe Line Co., Detroit.

66 miles, 24-inch, loops, Indiana, Illinois, and Michigan, authorized.

342 miles, 24-inch, gas, loops, Kansas, Missouri, Illinois, and Iowa, before FPC.

123 miles, 30-inch, loops, between Sandwich, Ill and Big Rapids, Mich., before FPC., contracts let on 530 miles to R. H. Fulton, Bechtel Corp., Somerville Construction Co., and Majestic Contractors.

37 miles, 6 and 12-inch lateral loops in Wisconsin, before FPC.

29 miles, 30-inch, loops, Illinois, Indiana, and Michigan, 3,000 hp. station, Janesville, Wis., before FPC.

Two 2,000 hp units at Meade, Kansas; one 2,000 hp unit at Havensville, Kansas, before FPC.

Midwestern Gas Transmission Co., Houston.

504 miles, 24-inch, gas, from Minnesota-Canada border near Winnipeg to Marshfield, Wis., $52 million, contracts let on main line to **Bechtel Corp., Grayco Constructors, Inc., H. C. Price Co., Houston Contracting Company, Contracting and Material Co.**, and **Panama, Inc.**

Laterals awarded to **Texas Pipeline Construction, Inc.** and **Bristow-Hyde Engineering Corp.** River crossings let to **Popich-Marine Construction Company, Pentzien, Inc.**, and **Missouri Valley Dredging Co.** Compressor stations awarded to **Houston Contracting Company.**

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Mississippi River Fuel Corp., St. Louis 20 miles, 12-inch, 3 miles, 4-inch, gas, 2,500 hp station, to develop underground storage reservoir at St. Jacobs field in Madison and St. Clair counties, Ill., $3 million.

Mississippi River Transmission Corp., (subsidiary Mississippi River Fuel), 115 miles, 24-inch, gas, southeast Missouri to St. Louis County, planned.

Natural Gas Gathering Co., Inc., (joint venture with Gulf Resources, Inc.) gas gathering facilities in Zapata and Starr counties Texas, before FPC.

Natural Gas Pipeline Company, Chicago, 151 miles, 36-inch, gas, loops, between Ford County, Kansas and Joliet, Ill. and 180 miles, 24-inch, main, from Minneola, Kansas to Kiowa County, Okla., $31 million, before FPC.

Contracts let on 188 miles, 24-inch to **R. H. Fulton & Co.,** and 158 miles, 36-inch, to **O. R. Burden Construction Corp.,** and **River Construction Corp.**

New Haven Pipeline, Inc., products line, New Haven, Conn. to Springfield, Mass., $2.5 million, planned.

Niagara Mohawk Power Corp., 122 miles, 12-inch, Watertown and Massena, N. Y., contract let to Fulghum Contracting Corporation pending FPC approval.

Northern Natural Gas Company, Omaha, Neb., 236 miles, gas, in Kansas, Nebraska, Iowa, Illinois and Wisconsin, and 14,050 hp, $25 million, before FPC.

124 miles, in Oklahoma, Kansas, Nebraska, Iowa, and Minnesota and 17,360 hp, $17 million, before FPC.

22 miles, in Iowa, $673,100, before FPC.

Contracts awarded on 640 miles of 3 to 30-inch to **Panama-Williams Corp., C. S. Lenoir Construction Co., Pipeline Welding Co., Prairie Construction Co., R. E. Reutzel Co., Underground Constructors.**

Contracts let on 18,800 hp to **Foor Engineering Co., Dresser Engineering Co., R. L. Frailey, Inc.,** and **Panama-Williams Corp.**

Northwestern Refining Co., crude gathering system, Rival and Lignite fields, North Dakota, $625,000, Public Service Commission approval.

Ohio Fuel Gas Co., 59 miles, gas, 4-24-inch main lines, in Belmont, Carroll, Cuyahoga, Fairfield, Logan, Lorain, Marion, Muskingum, Stark and Wayne counties, Ohio, $5.1 million, planned.

Pacific Gas & Electric Co., San Francisco, 296 miles, 36-inch, gas, from Malin, Ore., to Antioch, Calif., southern section of line from Canada to California, $82 million before California Public Utilities Commission.

Pacific Gas Transmission Co., San Francisco, 614 miles, 36-inch, Kingsgate B.C. to Malin, Ore., northern section of Canada to California line, $133 million FPC Examiner Approval.

Panhandle Eastern Pipe Line Co., Kansas City, 305 miles, 30-inch, 40 miles, 26-inch, gas, loops, and 43,000 hp, and gathering facilities, $60 million, before FCP.

Any way you look at it...

Tough insulating and shock-resistant neoprene body.
Steel shell bonded to neopene — engineered to meet all angles of maximum force.
Durable, solid super-hard plastic "fill" to withstand high-compressive loads.
SCALE: Approx. ¾ actual size
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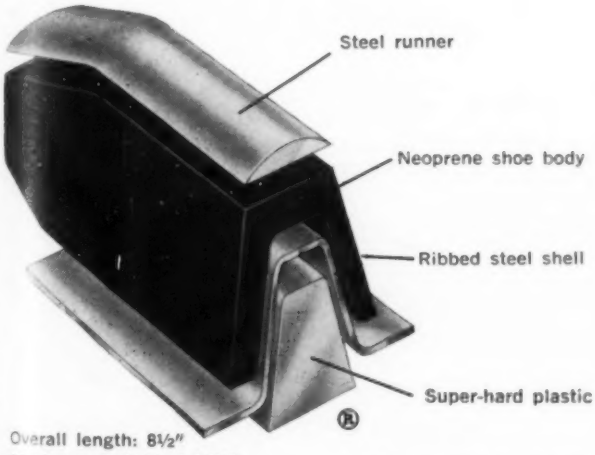

Overall length: 8½"
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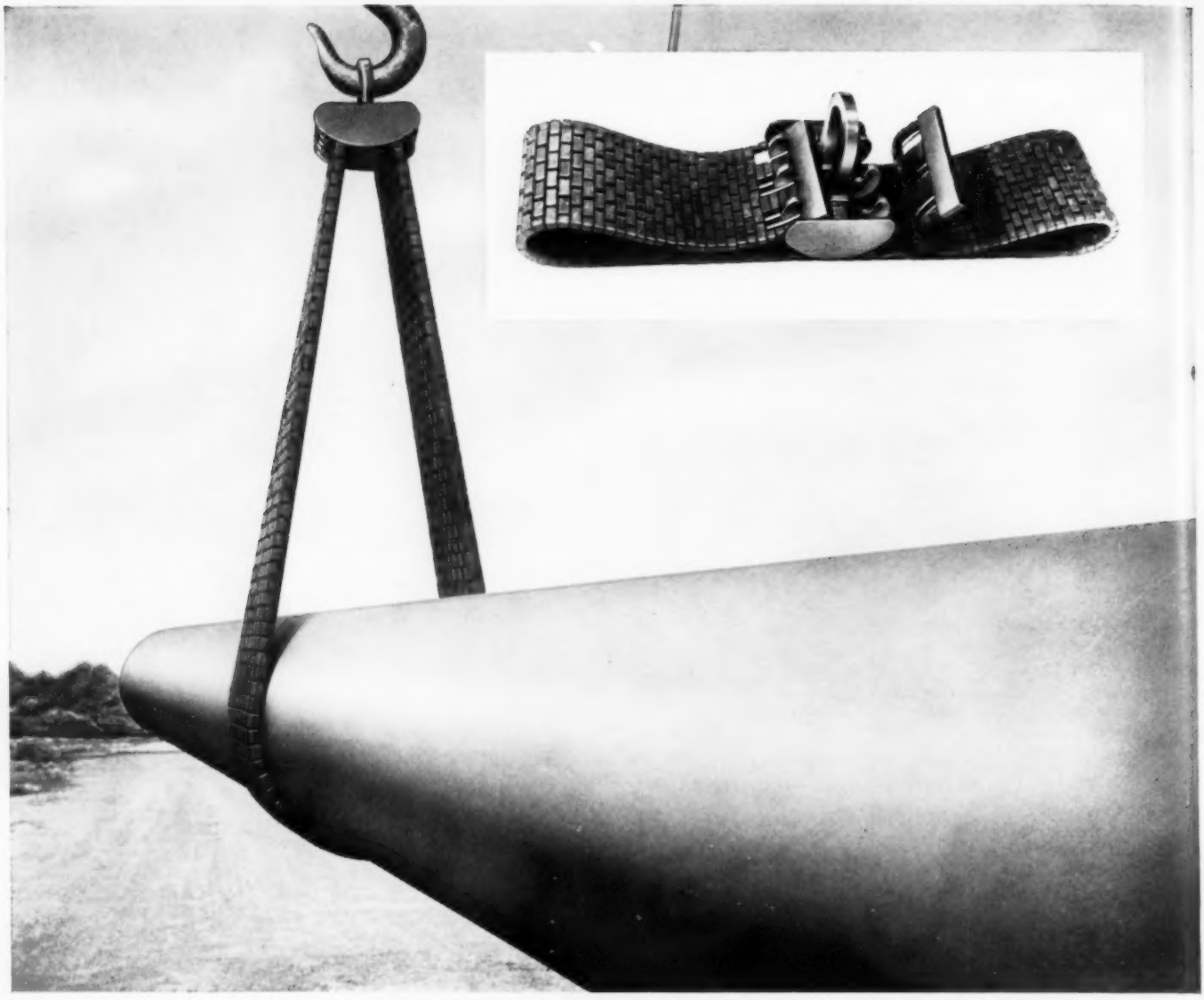

This "Swing Sling", 12" in width, was especially designed for handling pipe and other long cylindrical objects. Because of its wide-bearing surface, one sling will usually be enough to handle a standard section of pipe.

Now...you can handle pipe without surface damage using the new "Swing Sling"*

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CF&I STEEL

200 miles, 22-24-inch, gas, lateral, from Elk City, Okla., to Haven, Kan., before FPC.

Peoples Gas Light & Coke, Chicago, 29 miles, 36-inch, gas between North Shore and Calumet stations, planned.

Peoples Gulf Coast Natural Gas Pipeline Co., Chicago. 371 miles, 30-inch, loops, and 45 miles, gas laterals, 6,700 hp in Victoria County, Texas, $43.5 million, contracts let to **O. R. Burden Construction Corp., Panama-Williams Corp., Sharman, Allen, Gay & Taylor, Inc., River Construction Corp., H. C. Price Co.**, and **Stanley-Bledsoe.**

Plantation Pipe Line Company, Atlanta, 73 miles, 8-inch, products, Helena to Montgomery, Ala., contract let to **Latex Construction Co.**

Rio Gas Gathering Co., San Antonio, 97 miles, 3 to 8-inch, gas gathering, South Texas, to supply gas to El Paso Natural Gas Company, planned.

Rocky Mountain Natural Gas Company, 172 miles, gas, southwestern Colorado to serve Delta, Orchard City and Montrose, Colo., contract let to **H. C. Price Co.**

Southern California and Southern Counties Gas Cos., Los Angeles, 93 miles, 34-inch, California-Nevada border to Newberry, Calif., approved.

Standard Oil Company of California, 22 miles, 8-inch, crude, Kenai Peninsula to Nikiski, Alaska, $4 million, contract let to **Sharman, Allen, Gay & Taylor.**

St. Lawrence Gas Company, Inc., Ogdensburg, N. Y., 75 miles, gas, main, United States-Canadian border to Ogdensburg, N. Y., $3.4 million, FPC examiner approval.

Tennessee Gas Pipeline Co., Houston 191 miles, 30 and 36-inch loops, in Ohio, Pennsylvania and New York, 72 miles of gathering lines and 43,600 hp in five stations, $46 million before FPC.

158 miles, 36-inch, gas, loops in Mississippi and Louisiana, FPC authorization.

21 miles, 16-inch, 2 miles, 12-inch, gas, Louisiana coast, Vermilion blocks 46 and 64, $3 million, before FPC.

Teton Pipe Line Corporation, Wyoming, crude system consisting of 6-inch line from Miller Creek Oil Field in Crook County to the Rozet Oil Field, Campbell County; 100 miles, 8-inch, Rozet to Salt Creek Oil Field, Natrona County; 6-inch, Natrona to Dead Horse and Barber Creek Fields in Campbell and Johnson counties, and gathering facilities, before Public Service Commission.

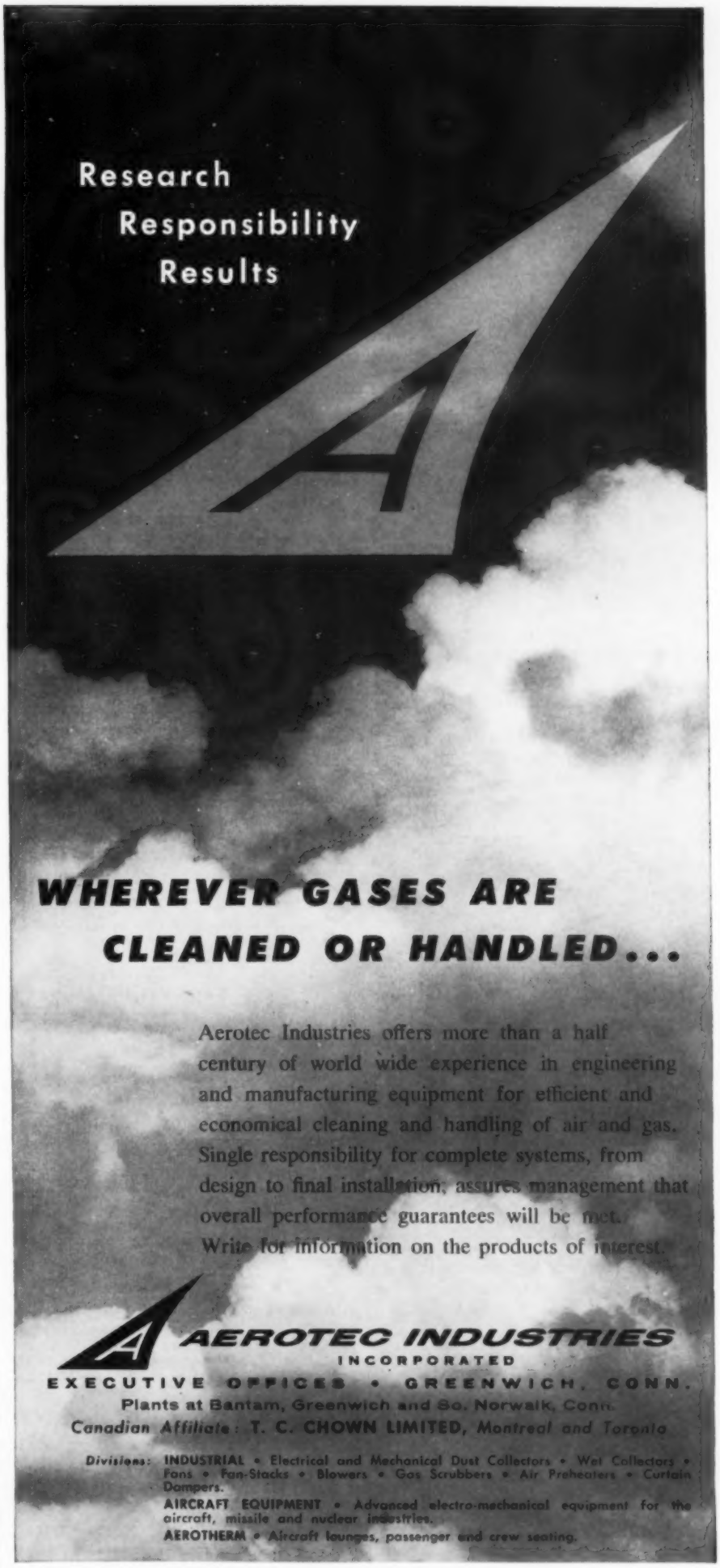
Texas Eastern Transmission Corp., Shreveport, La., 212 miles, 20 to 36-inch, gas, and 3,300 hp station, in Pennsylvania, New Jersey, New York and Mississippi, $46 million, contracts let to H. C. Price Co., Sharman Allen, Gay & Taylor, Inc., and Western Pipe Line, Inc.

66 miles, 30-inch, gas, loops, between Vidor, Texas and Lambertville, N. J., and 33,710 hp in four existing stations, $17.5 million, before FPC.

90 miles, LPG, Lebanon to Lima, Ohio, planned.

Extension of products line from Lebanon, Ohio, to Elmira, N.Y., considered.

350 miles, 24-inch, coal slurry, West Virginia to New York, considered.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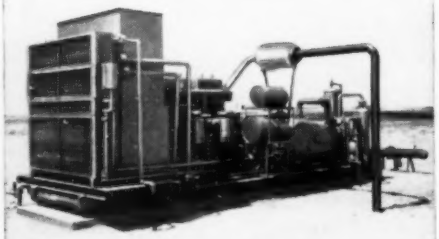

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All the proven features that insure long engine life and the ability to withstand overloads, and that result in low maintenance costs and economical operation, are built into these Waukesha engines . . . from precision-counterbalanced rugged crankshafts; pistons, rings, and rod and pin assemblies in matched sets, to built-in automatically lubricated governors and big capacity cooling and oiling systems. The line is complete; you can get exactly the right power for your needs. You can't buy better engines for continuous heavy duty compressor operation.

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Texas Gas Transmission Corporation, Owensboro, Ky., 23 miles, 30-inch, gas, loops, between Eunice and Bastrop, La., 56 miles, 12-inch, in Indiana. $8 million, FPC authorization.

Texas Southwestern Gas Corp., 100 miles, gas, Coleman to Jack County, Texas, considered.

Transcontinental Gas Pipe Line Corporation, Houston.

211 miles, 36-inch, and 69 miles, 30-inch, loops and additional 32,040 hp, in Texas, Louisiana, Mississippi, Alabama, Georgia and South Carolina, $52 million, before FPC.

13 miles, 24-inch and 18 miles, 20-inch loops, Louisiana, FPC authorization. 14 miles, 16-inch laterals, 1-mile, 12-inch lateral, Louisiana, $2.1 million, FPC authorization.

29 miles, 20-inch, gas, and 2,500 hp, in South Texas to take gas from South Texas Natural Gas Gathering Co., $2.4 million, before FPC.

Transok Pipe Line Company, 43 miles, 24-inch, Oolagah to Jenks, Okla., contract let to **Williams Brothers Co.**

Transwestern Pipeline Company, Houston, pipe line facilities to cost $5.4 million to make available additional gas reserves for the line presently under construction, before FPC.

Trunkline Gas Company, Houston, 252 miles, 30-inch loops, and 140 miles, laterals, between Longville, La., and Tuscola, Ill., $45 million, before FPC..

Underground Storage & Exploration, Upper Darby, Penn., 394 miles, 12-inch LPG, from Moundsville, W. Va. to Newark, N. J., $9 million, approved.

95 miles, 6-8 inch, laterals to Mauch Chunk, Penn., and to Philadelphia, planned.

United Gas Pipe Line Co., Shreveport, La., 59 miles, 36-inch, gas, lateral between Bastian Bay field and Plaquemines Parish, La., before FPC.

Valley Gas Transmission, Inc., Houston, 55 miles, 3 to 8-inch, gas, gathering, in Hidalgo, Brooks, Starr and Jim Wells counties, Texas, $15 million, before FPC.

International

ACT Oils, Ltd., Montreal, 400 miles, crude, Dawson Creek, B. C., to Bella Coola, B. C., before B. C. government.

Ajax Alberta Pipeline Ltd., 28 miles, 10-inch, gas, main, Morinville to Westlock, Alta., planned.

Alberta Gas Trunk Line Company, 386 miles, 26-36-inch, gas, main, Berland River area, Alberta, to Alberta-British Columbia border; and 235 miles, 8-18-inch, gas, gathering, Alberta, $100 million, Alberta Oil and Gas Conservation Board, approved.

Alberta Natural Gas Company (Jointly owned by Westcoast Transmission Co. and Alberta & Southern Gas Co. Ltd.) 110 miles, 36-inch, gas, Alberta border to British Columbia-Idaho border, supply gas to Pacific Gas & Electric Co., $40 million, planned.

Assistencia de Oleodutos du Petrobras, Rio de Janeiro, 280 miles, 12-inch, crude, Rio de Janeiro to Belo Horizonte, Brazil, planned.

Abu Dhabi Marine Areas Ltd., (British Petroleum Co. and Compagnie Francaise Des Petroles) 20 miles, 18-inch, crude, from Umm Shaif offshore oilfield to Das Island, Persian Gulf, planned.

Barnabos Group (Italian Interests), crude line from Venice, Italy, to Insbruck, Austria, with extension to Munich, Germany, planned.

Bituminous Oil Pipeline Co., Calgary, 250 miles, crude, from Athabasca tar sand plant in northeastern Alberta to Edmonton, approved.

British American Oil Co., Ltd., Toronto, 125 miles, gas, Pincher Creek fields to Calgary, Alta., before Alberta Public Utilities Board.

Burmah Oil Co., Ltd., 850 miles, crude, 20 inch, from Nahorkatiya to Calcutta, India.

Cartier Gas Corp. (St. Maurice Gas, Inc., and Consumers Gas Co., Toronto), 170 miles, gas, Montreal to Quebec City, planned.

Consolidated Gathering Systems, Ltd., Calgary, 198 miles, crude, Sturgeon field to Edmonton, planned.

Creole Petroleum Co., 44 miles, 12-30-inch, gas, Bachaquero to Tia Juana, Venezuela, planned.

Esso Standard Libya, 100 miles, 30-inch, crude, Zeltan oil field to Gulf of Sirte coast, planned.

Foothills Pipe Lines Ltd., 1,300 miles, LPG, from Alberta-Saskatchewan border to Chicago, tie-in with Westalta Products Pipeline proposed system in Alberta, $100 million, before Alberta Board of Public Utilities Commissioners.

Gas Trunk Line of British Columbia, Vancouver, 250 miles, 30-inch, gas, main, Fort Nelson to Taylor, B. C., planned.

Gases Naturales de Colombia, S.A., 140-mile, 10-inch, gas, Cicuco field to Barranquilla, Colombia, planned.

Hughenden Pipeline, 125 miles, products, Dick Lake gasoline plant to Hughenden Region, Alta., planned.

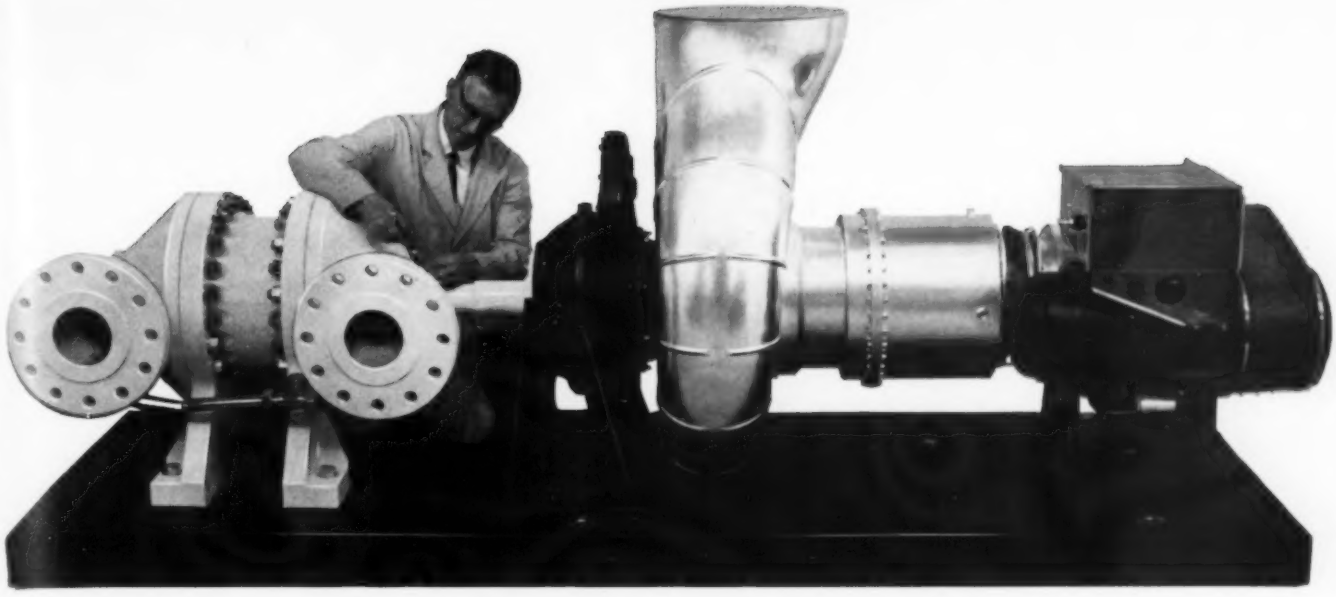
Hydrocarbons Pipeline, Ltd., Winnipeg, Manitoba, 880 miles, 6-8 inch, products, from Edmonton to Winnipeg, $35 million, partial authorization.

Independent Pipe Line Co., 2,019 miles, 34-36-inch, crude, Edmonton to Montreal, 23,000 pump horsepower, $395 million, before Borden Commission.

Interprovincial Pipe Line Company, 350-mile extension from Toronto to Montreal, looping line from Edmonton to Toronto, crude, $240 million, considered.

Additional horsepower in four new stations and several existing stations, $9.3 million, planned.

Magna Pipeline Co., 25 miles, 4-inch, gas, Vancouver, B.C. to Vancouver Island, $14 million, approved by Public Utilities Commission.



New Solar gas turbine compressor offers low cost, reliability, easy maintenance

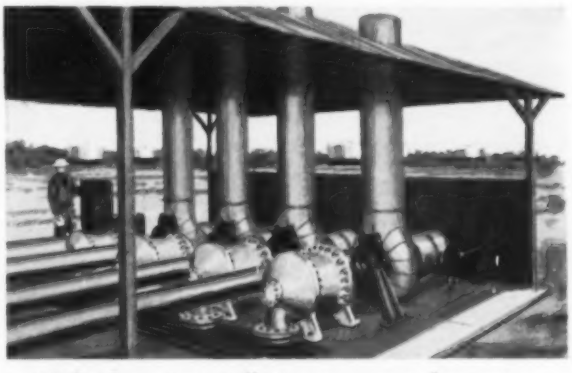
A FUNDAMENTAL ADVANCE in the centrifugal compressor field is available in Solar's new gas-turbine-driven compressor line. These units are particularly adapted for gas compression (both field and main pipeline) and for general industrial use in the low volume range up to 1500 psi.

Long-life gas turbine engines, with rotating speeds of 15,000 to 30,000 rpm, made this breakthrough possible. Driving the compressor directly at turbine speeds has permitted the design of small, high efficiency centrifugal compressors that operate in the range from 75 to 1500 cfm or 5 to 150 MM SCFD.

Features of these compressor packages include: Interchangeable compressor rotors and other parts that allow fast, low cost field changes to meet new flow and pressure requirements. Designed to start and stop in seconds, even by remote control, they are ideal for unattended operation. Small and lightweight, they are easily moved and installed on inexpensive foundations. Maintenance is unusually simple.

Detailed information on Solar centrifugal gas turbine compressors is available. Write to Dept. H-144, Solar Aircraft Company, San Diego 12, California.

Easy transportation for installation or maintenance



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Fort Madison, Iowa

Mid-Continent Pipe Lines, Ltd., 1500-mile, 30-inch crude, Edmonton to Chicago, planned.

Naphtha Israel Oil Co., 75 miles, 6-inch, gas, Rosh-Zohar field to Ashdod Yam on Mediterranean planned.

National Iranian Oil Co., 146 miles, 6 inch, crude, from Azna to Isfahan, Iran, $5 million, planned.

500 miles, 8-inch, products, Teheran to Meshed, Iran, contract let on 250 miles to Williams Bros. Co.

Northern Alberta Pipe Lines, Ltd., Edmonton, Alta., 110 miles, 10-inch, gas, main, Lac La Biche to Edmonton, $3 million, planned.

Northern Pipe Line Company, 153 miles, 16-inch, crude, from Regina, Saskatchewan, to Clearbrook, Minn., $10 million, planned.

Oasis Oil Co. of Libya, 100 miles, 30-inch, crude, Libyan production to Mediterranean, planned.

Peace River Oil Pipe Line Co., Ltd., 70-mile, crude, Swan Hills to Iosegun Junction, approved.

Pembina Pipe Line, Ltd., Edmonton, 1,200 miles, LPG, from Alberta gas fields to eastern Canada, planned.

Petroleos Mexicanos, 4, 6 and 8-inch, products, Mexico City-Puebla to Cuernavaca, planned.

1,240 miles, 34-inch, gas, Reynosa to San Luis Rio Colorado, Mexico, $160 million, negotiating with Tennessee Gas Pipeline Company for design and construction of the line.

8-inch, products, and 12-inch, gas Torreon to Chihuahua, to be built in 1960.

360 mile, 12-inch, products, Minatitlan to Puebla and Mexico City, construction to start in 1960.

Products, Guadalajara to Tepic, planned.

Products, Aguascalientes to Zacatecas, planned.

6-inch, products, Guaymas to Ciudad Obregon, considered.

8-inch products, Guaymas to Hermosillo, considered.

8-inch, gas, Tierra Blanca to Veracruz, to be built in 1960.

14-inch, gas, Mexico City to Salamanca, construction to start in 1960.

Gas, Ciudad Carmen to Ciudad Pemex.

8-inch, crude Comalcalco to Minatitlan, to be built in 1960.

Crude, Minatitlan to Salina Cruz, contingent on proposed refinery on Pacific Coast.

149 miles, 10-inch, products, Ciudad Pemex to Minatitlan, planned.

181 miles, 4-inch, products, Mexico City to Salamanca, planned.

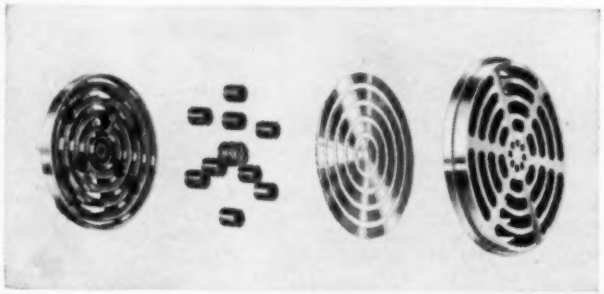
Pipelines of Puerto Rico, Inc., 95 miles, 8-inch, products, Penuelas to San Juan, Puerto Rico, approved.

Provincial Pipe Lines, Ltd., 700 miles, 3-16-inch, hydrocarbon line gathering system in Alberta, $25 million, before Alberta Oil and Gas Conservation Board.

Quebec Gas Transmission Lines, Inc., Montreal, 300 miles, gas, main, Quebec to Montreal, planned.

VOSS VALVES will mean LESS MAINTENANCE FEWER SHUTDOWNS for your COMPRESSORS

Voss Valves are made to specification, machined from solid stock (not cast)—using best alloy steels; for corrosion condition—stainless steels, such as 410, 18-8 or non-ferrous alloys—monel, inconel, etc. Plates are machined (not stamped) and ground for precise close tolerance fit; are dimensionally stable . . . ductile . . . resist fracture, high temperatures and corrosion . . . withstand fatigue. Springs of heavy rectangular sections and large diameters add to dependability and safety.



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PIPELINE PROTECTIVE COVERINGS THAT LAST

Rangeland Pipe Line Company Limited, 111 miles, 8-inch, crude, southeastern Alberta to Calgary, $3 million, planned.

Saskatchewan Power Corp., 179 miles, 4-6-8-inch, gas, planned.

Societa Nazionale Metanodotti, 650 miles, 18-inch, crude, Genoa, to Milan-Cremona-Torino, Italy, and Aigle, Switzerland, with extensions to Karlsruhe and Munich, Germany, planned.

Societe d'Etude du Pipe Line Sud-European, Paris, 419 miles, 30-inch, crude, port of Lavera to Strasbourg, with lateral extending 40 miles to Karlsruhe, Germany, approved by French cabinet.

Soc. Siciliana Metanadotti, gas line from Hassi R'Mel field in Algeria through Tunisia, across Mediterranean to Sicily and into Italy, considered.

Standard-Vacuum Oil Company, 60 miles, 8-inch, gas, main, in South Sumatra, considered.

Ste. d-Etudes de Pipeline Intercontinetaux, Paris, 1,400 miles, 30-40-inch, gas, from Hassi R'Mel field in central Algeria across Mediterranean, through Spain, France and into West Germany, considered, Fish International Corporation making engineering and feasibility studies.

Sui Gas Transmission Co., Multan, Punjab, India, 145 miles, 8-inch, gas, from Sylhet to Dacca, East Pakistan, $9 million, considered.

130 miles, 16-inch, gas, main line, Multan to Lyallpur, planned.

Syrian Pipeline, Damascus, 500 miles, crude, from Karshuk field, Syria to Mediterranean, planned.

300 miles, products, from Homs to tank farms in Damascus, Aleppo and Latakia, planned.

Trans-Canada Pipe Lines Limited, Toronto, 50-mile, 30-inch, gas, lateral, Winnipeg to Emerson, Manitoba; 74 miles, 34-inch, loops, additional compressor hp at Swift Current, and Indian Head, Saskatchewan, and Portage la Prairie, Manitoba, $45 million, planned.

268 miles, 34-inch, loops, and additional hp planned for 1961, $69 million.

122 miles, 34-inch, loops, hp additions, $46 million, planned for 1962.

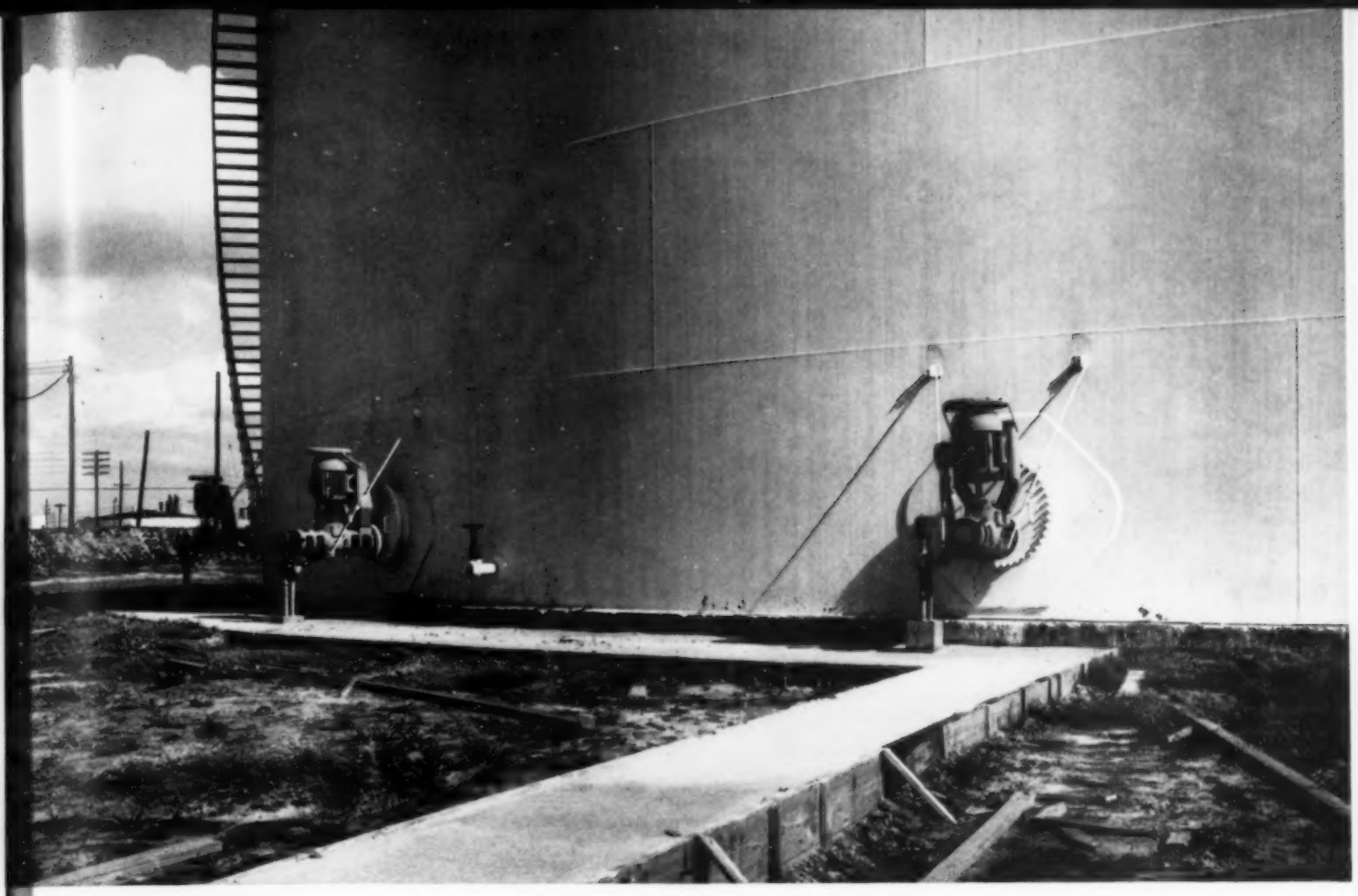
Trans-Prairie Pipelines, Ltd., Edmonton, crude line, from Weyburn field to Regina-Moose Jaw areas, $5 million, considered.

Westalta Products Pipeline Ltd., 900 miles, LPG, from Northern Alberta to Saskatchewan border, to deliver hydrocarbons to Foothills Pipe Lines, $40 million, before Alberta Board of Public Utilities Commissioners.

Williams-McWilliams Industries, Inc., New York, 441 miles, 6-inch, crude, Villa Montes, Bolivia to Villa Hayes, Paraguay, considered.

Westcoast Transmission Company, 688 miles, 30-inch, gas, loops, Peace River area of British Columbia to United States border, planned.

Yacimientos, Petroliferos Fiscales Argentina, Buenos Aires, 1,000-mile, large diameter, gas, Comodoro Rivadavia to Buenos Aires, $300 million, considered.



How they keep crude from **stacking up like pancakes**

Surging into this tank come crudes from wells scattered over 23 counties.

Out of the tank comes *one* crude, at the right gravity to feed to refineries more than 450 miles away.

For the men who run the tank farm, it's no chore at all to blend 122,000 barrels of crudes ranging from less than 20° to above 85° in gravity. They do it by flipping three switches.

The LIGHTNIN Mixers you see here do the rest. While the tank is filling, and for two or three hours before it goes on suction, the mixers create a powerful, steady turnover that breaks up stratification from the bottom up. The outgoing tender of crude stays within a degree or two of constant gravity.

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Multiply these savings by the number of tanks at this farm equipped with LIGHTNIN Mixers—and you can see why more than 50 pipeline companies and 35 leading oil companies use this easy way to keep operating costs in line.

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YOU CAN ADD as much as 12% extra storage capacity to your tank farm—by using LIGHTNIN Mixers to keep tanks free of space-eating sludge. Mixing results are unconditionally guaranteed.

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- ☐ Side-entering mixers, 1 to 25 hp (B-104)
- ☐ Data sheet for figuring mixer requirements (B-107)
- ☐ Condensed catalog describing LIGHTNIN Mixers—all types (B-109)
- ☐ LIGHTNIN rotary mechanical seals to eliminate stuffing-box maintenance (B-111)

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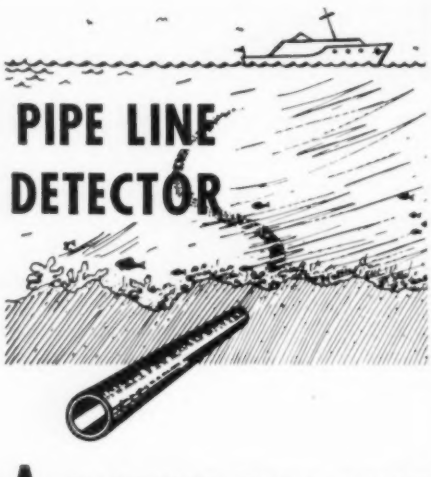

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What's Happening among MEN in the INDUSTRY

Charles R. Younts

Silas V. Kane

Charles R. Younts, chairman of the board of **Plantation Pipe Line Company,** has retired after 48 years service in the petroleum and pipe line industry. Younts had been president of Plantation from 1941 until 1959, when he was named chairman of the board.

W. B. Mackenzie

Plantation also announces the appointments of **Silas V. Kane** as vice president-treasurer and a director and **Walter B. Mackenzie** as secretary.

Younts began his career with **Standard Oil Company of New Jersey** as an office boy in 1912. He rose to various managerial positions with the oil company and when Plantation went into operation in 1941, he was appointed president. He will devote his time to nonprofit and charitable institutions.

Kane has been with the company since 1940, and secretary-treasurer in 1943. Mackenzie has been with Plantation since 1960, and started his career with Standard Oil Company of New Jersey in 1940. Kane earlier served with Tuscarora Oil Company, Ltd., and the Ajax Pipe Line Company.

Fred W. Batten has been named a vice president and chief operations officer of the **Columbia Gas System, Inc.** Batten has been vice president of **Columbia Gas System Service Corporation** since 1956. He will be responsible for the system's production, transmission distribution and extraction of heavier hydrocarbons from gas streams.

Batten joined the Columbia Gas System in 1936, as an engineer. In 1947, he was transferred to the New York office of the Service Corporation and became assistant vice president in 1951. He became general manager of the Columbia Pittsburgh Group in 1952.

Herman A. Engel, Jr., has been named coordinator of Economics and Evaluation for **Union Texas Natural Gas Corporation.** Engel formerly had been Canadian Division manager in Calgary.

Columbia Gas System, Inc., has elected **George S. Young** chairman of the board and chief executive officer and named **Cecil E. Loomis** president of Columbia succeeding Young.

Young joined Columbia Engineering and Management Corporation as a junior engineer in 1930. He came to New York in 1942 as vice president of what is now **Columbia Gas System Service Corporation.** He was elected executive vice president of the Columbia Gas System, Inc., in 1949, and in 1951, he was named president.

Loomis has been with the organization since 1928. He was appointed assistant vice president of Columbia as chief aide to Young in 1950.

Pasotex Pipe Line Company has appointed **E. I. Allen,** formerly general superintendent, as manager. He succeeds **G. R. Axelson** who has retired.

Shell Pipe Line Corporation announces several changes in its field divisions. **E. B. Mitchell,** formerly district superintendent, Healdton, Mid-Continent Division, becomes supervisor, operations-engineering, Texas-Gulf Division. He succeeds **J. P. Carver,** who retired.

C. M. Merrill, district superintendent, Farmington, Four Corners Division, will replace Mitchell. **N. G. Wilson,** division engineer, West Texas Division, succeeds Merrill at Farmington. **D. C. Simpson,** engineer, Operating Services Department, Head Office, assumes Wilson's position.

Shell also announces appointments in its communications section. Shell's communications services are being expanded to provide additional services for other Shell companies. Changes include **R. L. Ransome,** senior communications engineer, and **G. H. Craig,** communications engineers. Transportation and Communications Group, have been transferred from **Shell Oil Company** to Shell Pipe Line Corp. in Houston.

Cities Service Gas Company has named **Charles T. Klein** a vice president and director. Klein has been manager of the Natural Gas Division and a member of the board of **Cities Service Oil Company.** He has been with Cities Service organization since 1946 as an attorney in the Legal Division of the oil company. He became manager of the company's Natural Gas Division in 1949, and elected a director in 1953.

Charles T. Klein

He also is a director of the Independent Natural Gas Association of America, a member of the American Gas Association and the Oklahoma and American Bar Association.

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for the first time, a new x-ray film packaging that saves time and lowers costs at no sacrifice in quality.

Interrupting operations to open small quantities of X-ray film? Handling many small packages and wrappings? Never again with Ansco SUPERPAK. New Ansco SUPERPAK® is the modern way to increase your efficiency through 600 non-interleaved sheet or 300 interleaved sheet packages of Superay 'A' or Superay 'B'.

Whenever the storage bins (SUPERPAK fits standard film storage bins) need refilling, pause for a moment to open SUPERPAK, work on until the job is completed without further interruptions. Just think of the savings in man-hours and money through this new, sensible method of packaging.

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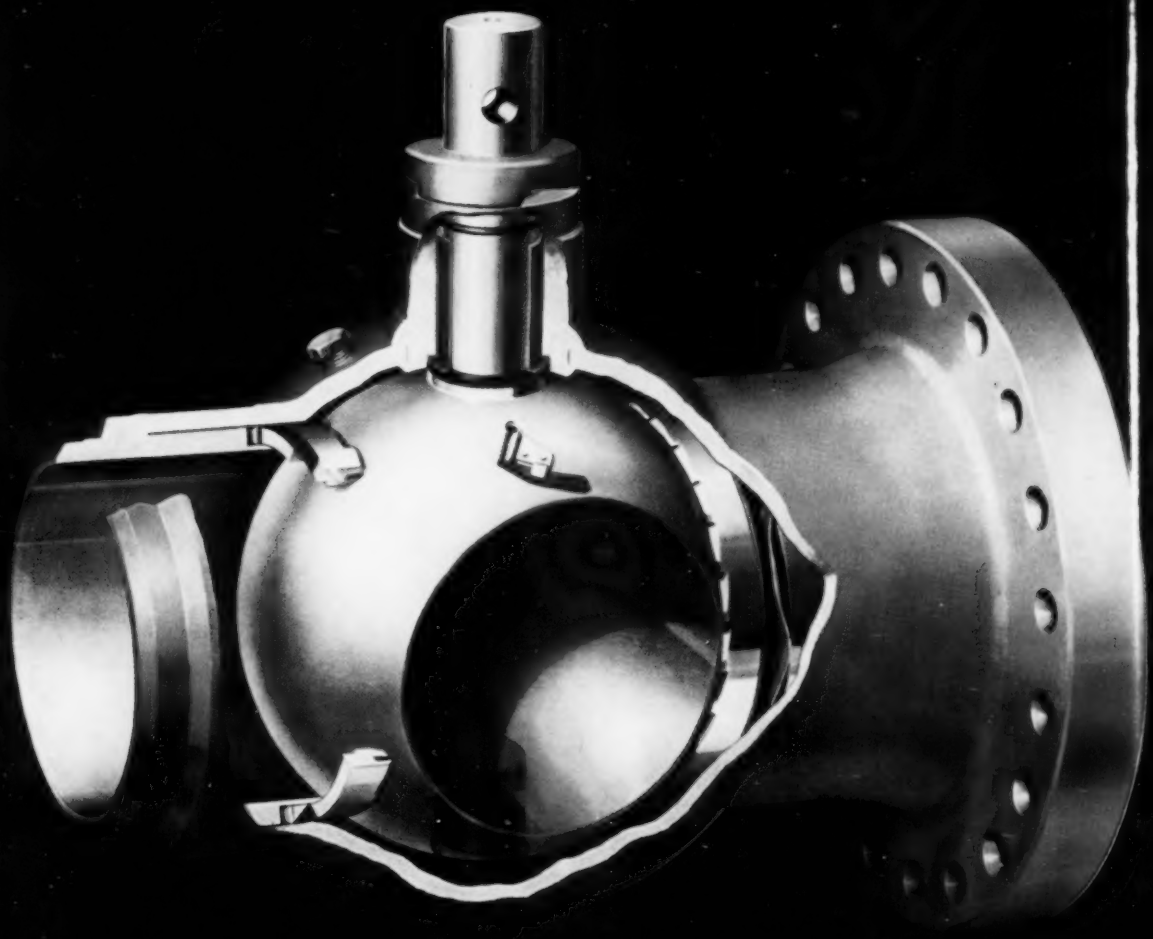

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These valves handle the most abrasive and corrosive fluids—cannot freeze—cannot develop excessive body pressure; provide up-stream seating, double block and bleed, all with unbelievably easy operation.

CAMERON BALL VALVES SEAL ON A NEW SURFACE WITH EACH OPERATION

ROTATING SEAT PRINCIPLE

CAMERON BALL VALVES use an advanced form of the exclusive rotating seat principle* made famous in Cameron's Type "F" Gate Valve. Each operation of the valve partially rotates the seat to change the relation of the mating surfaces and to provide a continuous reseating action.

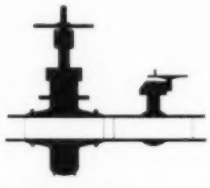
The astounding improvement in service life and tightness brought on by this advancement places the CAMERON BALL VALVE in a completely new dimension of reliability and extended use—permits for the first time "sealed for life" construction.

*Patents Applied For

NEW MANUFACTURING CONCEPT

Cameron has developed a new technique of manufacture, incorporating a new design*, which permits forging, machining and welding in successive steps. This results in a new kind of structure that is totally accurate and the ultimate in simplicity.

*Patents Applied For

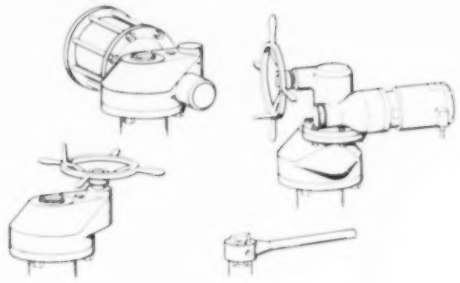


COMPACT DESIGN

This new design concept eliminates bonnets, gaskets and joints and all the problems that arise from them. The weight of these valves is remarkably low and they require only a fraction of the space needed for other valves.

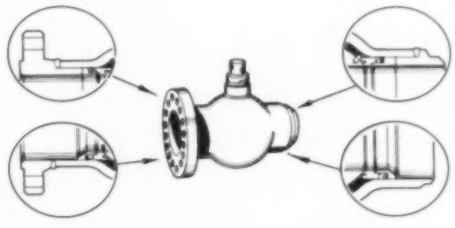
NO MORE LUBRICATION

CAMERON BALL VALVES require no lubrication at any time. Moving surfaces slide on low friction Teflon to seal all joints and provide a life-time of easy operation and bubble-tight service without lubrication.



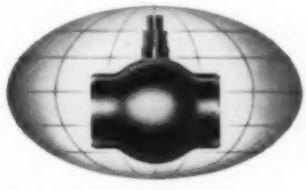
OPERATORS

The CAMERON BALL VALVE requires only a fraction of the effort that other valves must have to operate. Much larger valves may be lever operated with ease. When necessary, highly efficient gear operators requiring a minimum of turns and effort are provided. All types of electrical, pneumatic and hydraulic operators manufactured by Cameron are available and special operation problems are solicited. Operators of other manufacture may be installed on request.



SIZES AND TYPES

CAMERON BALL VALVES are available in regular and full bore sizes from 2" to 36" in W.P. 150 psi to 5000 psi. They may be provided, with any end preparation required. Larger bore sizes are available on special order.



CAMERON BALL VALVES are available and will be manufactured worldwide in five Cameron Plants—France, England, Canada, Mexico and the United States. Processes in each plant follow the same specifications and rigid controls established by the home plant in Houston, Texas.

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Transwestern's pipeline to carry Texas and Oklahoma gas to the West Coast, largest gas transmission project for 1960, was completed and turned over to the owners early in July. Thus, the more than 1800-mile system was laid through some of the roughest terrain under unusually severe weather conditions well ahead of the original target date. Houston Contracting, a prime contractor on the project, is proud to have contributed to this record.

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SOUTH BEND 21, INDIANA

Texas Eastern Transmission Corporation announces the promotion of **Ernest T. Robinson, Jr.**, to vice president in charge of gas operations. He succeeds the position formerly held by **E. R. Cunningham**, who has retired.

E. T. Robinson, Jr.

Robinson will be responsible for all phases of operations of the company's 6,350-mile natural gas system, including communications, transportation, compressor station operations, right-of-way, measurement, corrosion control, gas storage and maintenance programs.

Robinson has been with the company since 1947, when the company was formed. He has served as engineer, assistant pipe line superintendent, division manager, assistant general superintendent and since 1957, as general superintendent of gas operations. In 1939, he joined United Gas Pipe Line Company and from 1943 to 1947, was an engineer for Columbia Gasoline and Carbon Company.

Robert O. Anderson, president of **Hondo Oil and Gas Company** has been elected a member of the board of directors of **Northern Natural Gas Company.** He replaces Fred C. Koch, who resigned. Anderson has been in the industry for 20 years and also is president of John W. Williamson and Sons, Inc.; Lincoln County Livestock Company; the Sierra Blanca Corporation and Fred M. Manning, Ltd.

Fred L. Plummer has been elected international vice president of the **International Institute of Welding.** Plummer, national secretary of the American Welding Society and chairman of the American Council which directs American activities of the institute, has served terms as president of the AWS.

Also he had been director of engineering for the Hammond Iron Works and headed the Bailey Bridge Mission to Japan for the U. S. Army Corps. of Engineers. The IIW has a membership of 27 nations to promote the development of welding by all processes and assist in the formation of international standards.

Union Texas Natural Gas Corporation announces the election of **Daniel B. Lovejoy** a director of the company. Lovejoy has been senior vice president of the company. He joined the company in 1938, and is in charge of all financial affairs of the corporation.

Karl T. Feldman, part-interest executive, **Sinclair Pipe Line Company,** was elected to the board of directors of **Great Lakes Pipe Line Company.** He replaces **James E. Dyer,** vice chairman of the board, **Sinclair Oil Corporation.**

Sun Oil Company has named **Martin A. Row** to the newly-created position of counsel for regulatory and natural gas matters for Sun. Row will be succeeded by **Charles F. Heidrick** as general attorney for the Southwest Production Division, Dallas. Row has been a member of the Sun legal staff for almost 30 years. Heidrick joined the company in 1938.

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Available at Pipe Line Service—Harvey, La.

Complete facilities for applying

ANCHORCRETE®

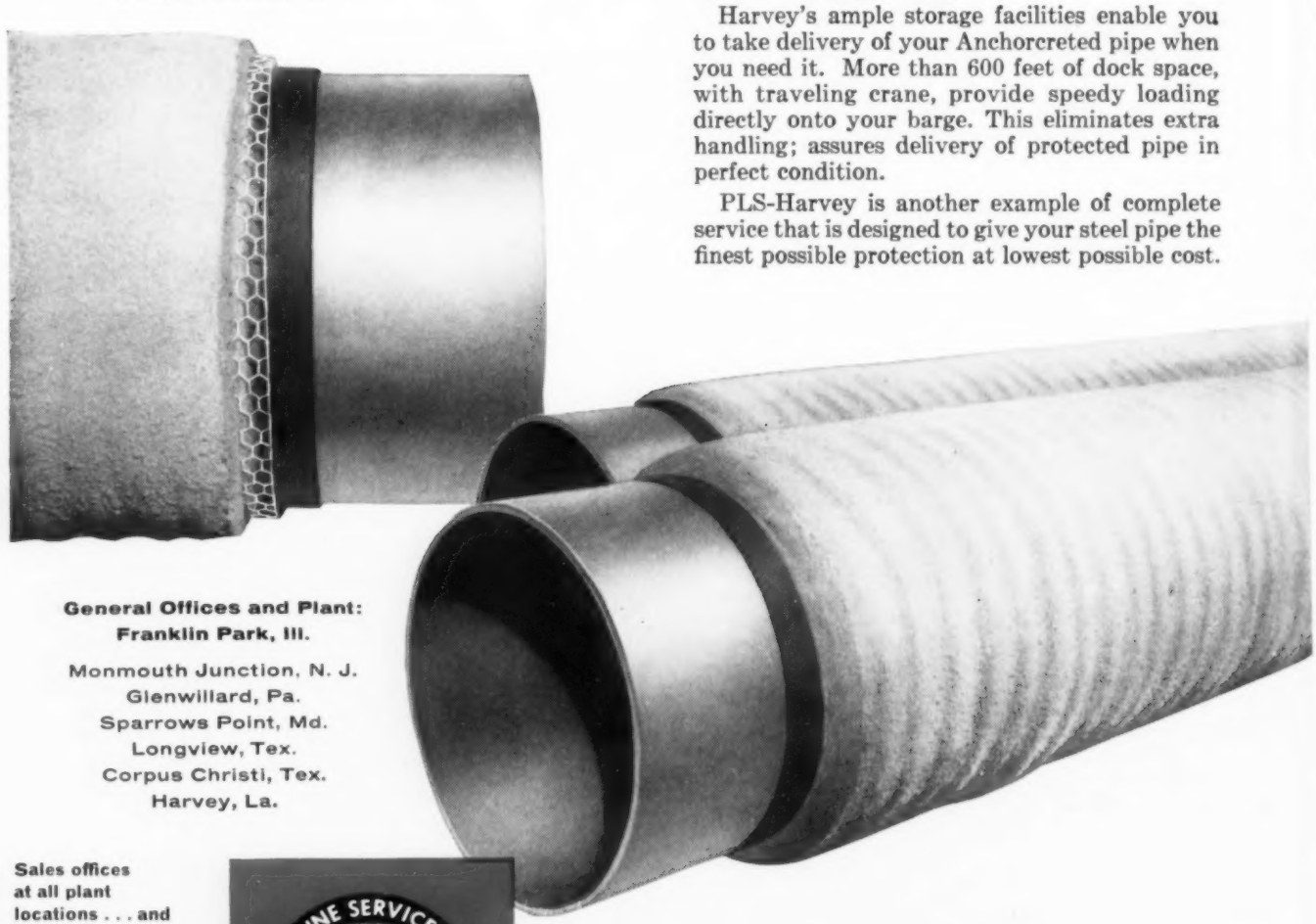
Concrete Coatings

When your pipelines require anchoring to offset buoyancy, remember that Pipe Line Service's Harvey plant is completely equipped to apply dependable "Anchorcrete" reinforced concrete coating over high-quality PLS coating and wrapping specifications.

From unloading the bare pipe to loading of the finished product, all operations are under one supervision . . . *one* responsibility. Uniform quality of Anchorcrete is assured through use of prime materials, careful batching, controlled mixing and thorough curing.

Harvey's ample storage facilities enable you to take delivery of your Anchorcreted pipe when you need it. More than 600 feet of dock space, with traveling crane, provide speedy loading directly onto your barge. This eliminates extra handling; assures delivery of protected pipe in perfect condition.

PLS-Harvey is another example of complete service that is designed to give your steel pipe the finest possible protection at lowest possible cost.



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Quality pioneers in coating and wrapping pipe for over a quarter century

The American Society of Mechanical Engineers has named **Joe J. King,** senior vice president of **Tennessee Gas Transmission Company,** a fellow member of the society at a dinner held in his honor in Houston last month.

H. **Lee Norris, Jr.,** Relephord & Norris Consulting Engineers, bestowed the highest grade of the society's membership to King and pointed out that less than one percent of the society's 48,000 members have been named a fellow member. King began his career in 1925, and served with Cities Service Gas Company, Magnolia Gas Company, United Gas Pipe Line Company and the Texas Company until 1946. He was chief of pipe line section and executive officer of the Petroleum Branch, War Plans Division, Office of Chief Engineers, during World War II.

He joined Tennessee in 1946, was named chief engineer in 1949, vice president in 1951, and senior vice president in 1958. He also is a director of the Petro-Tex Chemical Corporation of Houston.

Continental Pipe Line Company has appointed **N. B. Mavris** and **J. C. Phelps** vice presidents. Phelps will head planning and engineering. **Mavris** succeeds **John L. Kelly,** who was named general manager of **Continental Oil Company's** southwestern region. He will be in charge of operations.

Mavris had been assistant chief engineer and an assistant to vice president of operations. In 1954, Phelps was named manager of new plans and projects.

Trunkline Gas Company announces the appointment of **James LeBlanc** to Houston district landman. He has been with the company since 1957. He had been with Mid-States Oil Corporation previously.

Earl A. Matheny has been elected treasurer of **Mid-America Pipeline Company.** With 14 years experience in the corporate administration and financial management, Matheny formerly served as treasurer for Jenkins Music Company. He will headquarter in Tulsa.

Earl A. Matheny

Mid-America is presently constructing an 1,800 mile liquefied petroleum gas products line from Texas and New Mexico, to the St. Paul, Minn., and Milwaukee, Wis., areas.

American Gas Association announces the promotion of **Irwin S. Schwimmer** to assistant director of the Bureau of Statistics. He had been on the Bureau staff for the past 12 years and also will become the Bureau's rate specialist.

He came to American Gas Association after serving with the National Industrial Conference Board, New York.

Ira S. French has been named director of public relations for the **Instrument Society of America.** French has been with the ISA since 1959. French has a background of newspaper and press services experience and had been an account executive in the public relation department of Ketchum, MacLeod & Grove, Inc.

William R. Clark has been appointed assistant chief geologist for **Natural Gas Storage Company of Illinois.** Clark has been with the company since 1952, has been district geologist since 1955.

H. C. Teasdel has been elected vice president and director and **Glenn N. Forgan** a director of **General Gas Corporation.** Teasdel previously had served as president and chairman of the board of The California Company. Forgan is vice president of the First National Bank of Chicago, and serves as head of the bank's division which handles all phases of the institution's oil and gas financing activities.

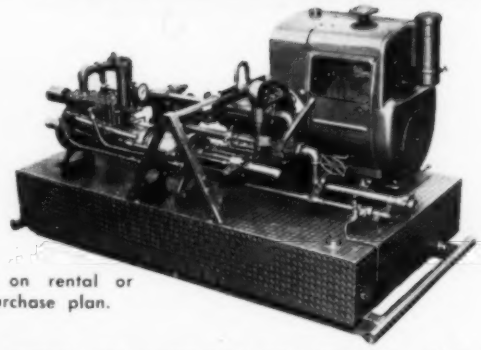
Lawrence J. O'Connor, who has served the past year as assistant director of the Office of Oil and Gas, has been named to succeed **Capt. Matthew V. Carson, Jr.** as administrator of the government's mandatory oil imports controls program.

D. C. Wixson has been appointed administrative vice president for the **Sunray Mid-Continent Oil Co.** and subsidiaries. Wixson will serve **Sunray Oil Co.** and **Mid-Continent Pipe Line Co.** A veteran of 34 years with the companies he has served in a number of executive capacities including general manager and vice president for marketing and administrative vice president for DX Sunray.

Marine Pipeline & Dredging, Ltd., announces the appointment of **E. A. Hooper** as assistant general manager. He has had over 20 years experience in construction and pipe line industry in Canada. His headquarters will be in Vancouver.

UDELL

PORTABLE HYDROSTATIC TESTING UNIT



Available on rental or lease-purchase plan.

Skid mounted and completely self contained, this unit delivers pressure to 20,000 psi. Operating components are mounted on the 200 gallon water tank. Variable test pressures provided by Udell Model "6B" two-stage, double-acting pump. Water pump delivers 250 GPM. Selected test pressure is maintained by engine throttle. Write for complete data and specifications.

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CAN BE INSTALLED OR REMOVED UNDER PRESSURE!

CUTAWAY VIEW OF PIPELINE

Gives visual or electrical indication of pig passage. Pig-Sig II with electrical indicator signals pump station operator or starts operation of automatic equipment. For other applications and complete details write for bulletin A-199.

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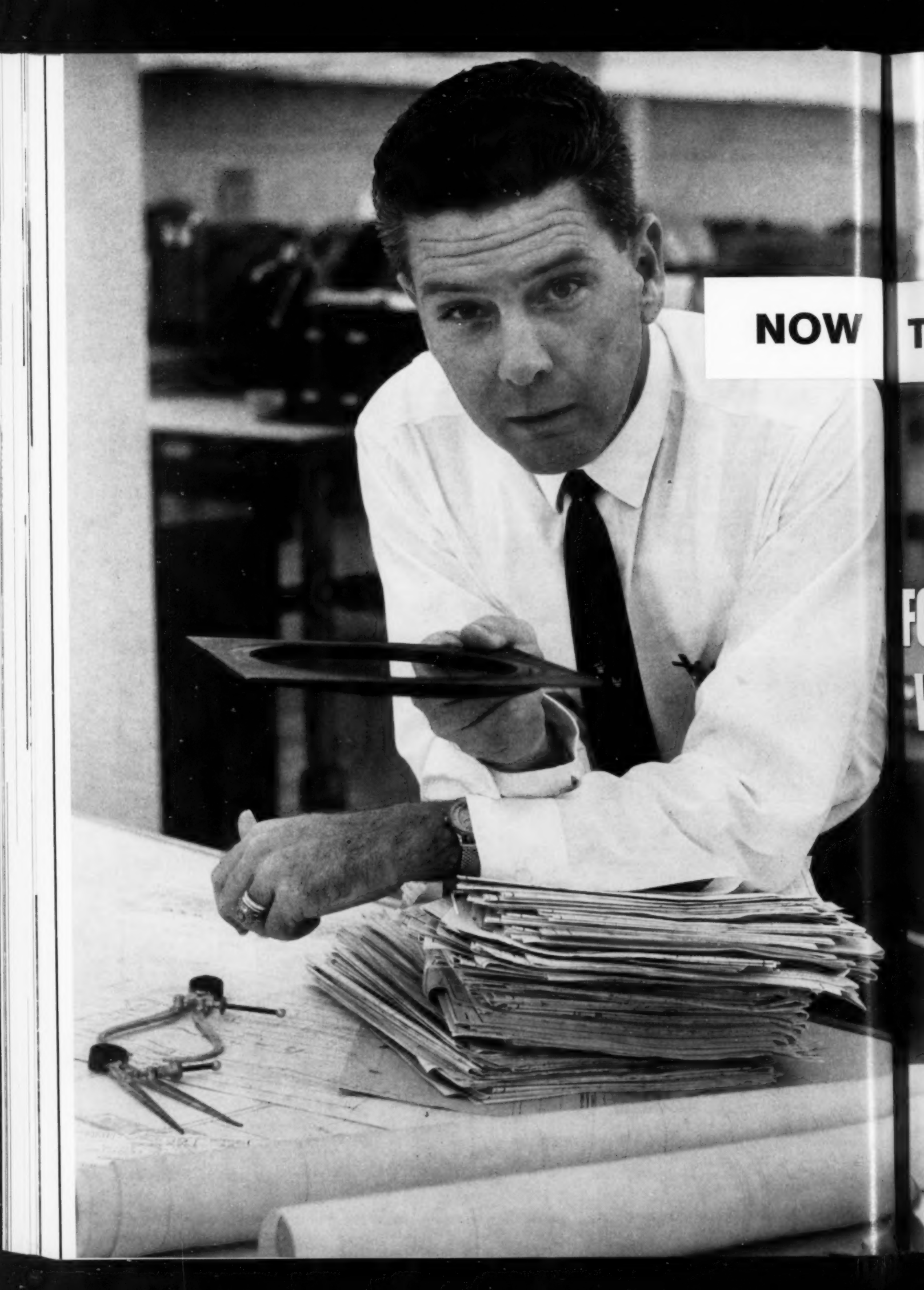
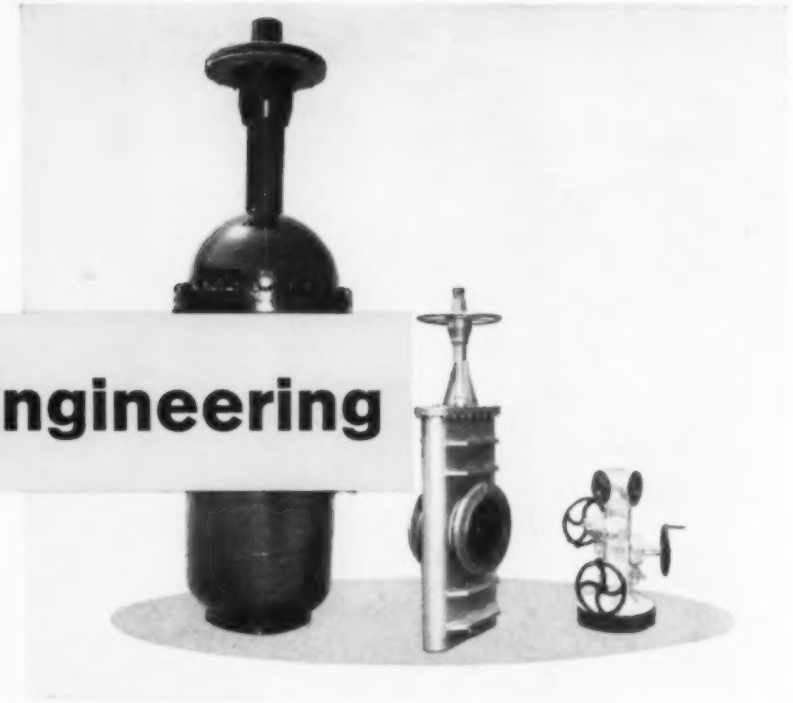
REPRESENTATIVES AROUND THE WORLD


NOW

TOTAL Valve Engineering



Left to right above, W-K-M's new: *Safe-T-Seal* Gate Valve (ASA); Pressure Sealing Gate Valve (ASA); Cross-type Triple Gate Valve (API).

112 IDEAS FOR THIS ONE W-K-M PART

New valves are being developed to outperform any you've ever known

From 112 designs by W-K-M engineers came an unusual valve seat. It is the secret of performance in W-K-M's new Pressure Sealing Gate Valve . . . and a hint of things to come.

Under wraps in W-K-M's Research and Development Laboratory are experimental valves looking like none you've ever seen . . . prototypes being tortured to simulate a lifetime of hard service. And, in restricted field installations, new models with no marking or identification, are making their final test runs.

W-K-M's exhaustive research and development program is a vital part of TOTAL Valve Engineering—W-K-M's unique dedication to *all* phases of valve technology. From it come today's valves and valves of the future . . . designed to work better, last longer . . . on the world's toughest jobs.

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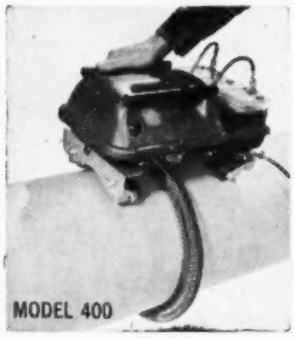
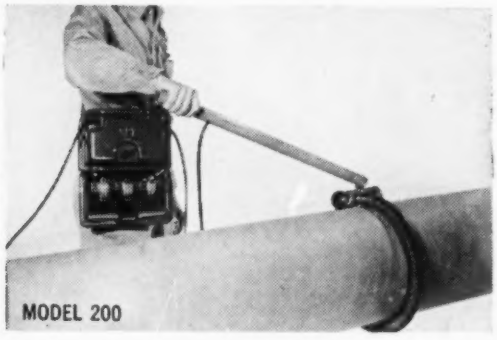
. . . our SPY HOLIDAY DETECTORS are as near as your telephone—in fact, in emergencies our own plane assures immediate service.





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Call, wire or write.

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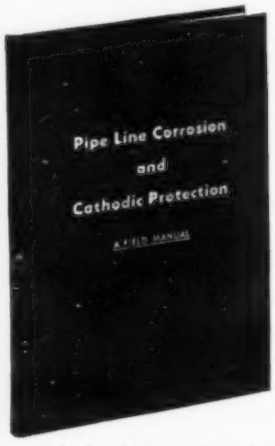

The most practical on-the-job manual for men concerned with pipe line corrosion.

Pipe Line Corrosion and Cathodic Protection

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This book is designed as a practical field manual. It provides workable methods that can save you valuable time and effort in obtaining interpretive field data.

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WHO'S MEETING WHERE

August

North Dakota Oil and Gas Association, annual meeting, Grand Pacific Hotel, Bismarck, N.D., August 14-19.

Appalachian Gas Measurement Short Course, University of West Virginia, Morgantown, W. Va., August 29-31.

September

ASME, joint automatic control conference, Massachusetts Institute of Technology, Cambridge, Mass., September 7-9.

NGAA, Rocky Mountain Regional Meeting, Palliser Hotel, Calgary, Alb., September 15.

ASME-AIEE, power conference, Bellevue-Stratford Hotel, Philadelphia, Pa., September 15-16.

ASME, petroleum division meeting, Jung Hotel, New Orleans, Sept. 18-21.

Texas Mid-Continent Oil & Gas Association, forty-first annual meeting, Hilton Hotel, San Antonio, Texas, September 19-21.

Pacific Coast Gas Association, annual convention, Westward Ho Hotel, Phoenix, Ariz., September 21-23.

AIEE, electrical conference of petroleum industry, Hotel Skirvin, Oklahoma City, Sept. 25-28.

American Welding Society, national fall meeting. Hotel Penn-Sheraton, Pittsburgh, Pa., September 26-29.

Instrument Society of America, 15th annual meeting, New York City, September 26-30.

Mid-West Gas Association, annual conference, Iowa State College, Ames Iowa, September 27-29.

October

INGAA, annual meeting, Fontainebleau Hotel, Miami Beach, Fla., Oct. 3-4.

NACE, 10th annual Western Region Conference, Sheraton-Palace Hotel, San Francisco, October 6-7.

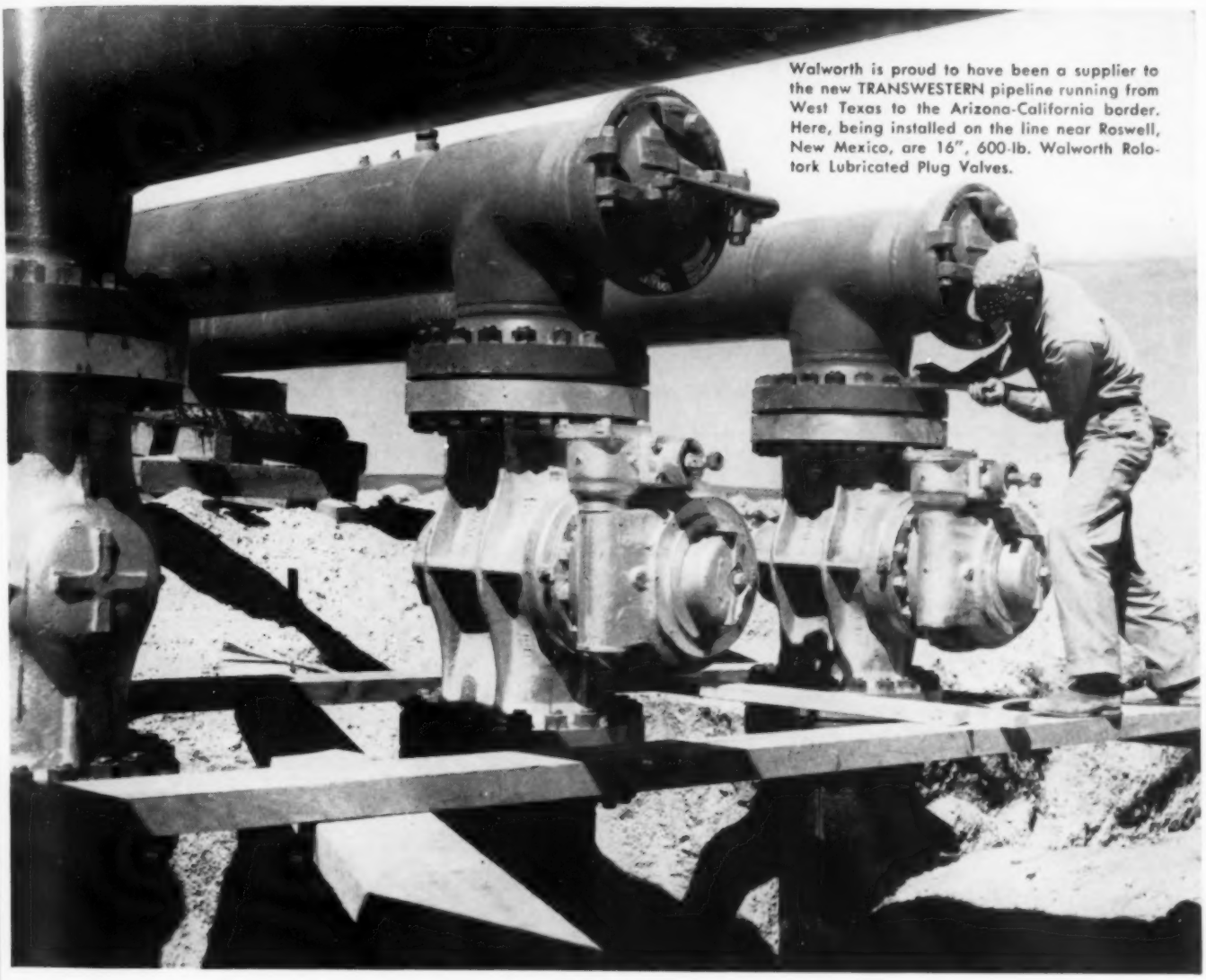
NACE, Southeast Region Conference, Dinkler-Plaza Hotel, Atlanta, Ga., October 6-8.

AGA, annual convention, Atlantic City, N. J., October 10-12.

NACE, Northeast Region Conference, Prichard Hotel, Huntington, W. Va., Oct. 11-14.

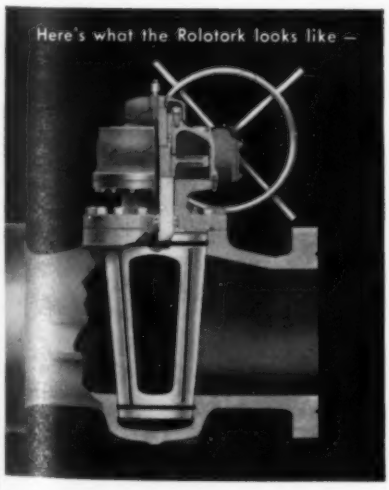
California Natural Gasoline Association, fall meeting, Hotel Miramar, Santa Monica, Calif., 13-14.

ASME-ASLE, lubrication conference, Statler Hilton, Boston, October 17-19.



Walworth is proud to have been a supplier to the new TRANSWESTERN pipeline running from West Texas to the Arizona-California border. Here, being installed on the line near Roswell, New Mexico, are 16", 600-lb. Walworth Rolotork Lubricated Plug Valves.

RELY ON *ROLOTORK* ...BY WALWORTH



No matter what the service, you can rely on the Walworth Rolotork Lubricated Plug Valve to operate easily and dependably in handling gas, crude or finished petroleum products. In service throughout the world, these valves have proved their complete dependability. Why? Because Walworth manufactures a *better* LPV.

The Rolotork turns more easily, closes tighter, and requires less maintenance. It can be lubricated without removing the lubricant fitting. The gear housing design permits simple attachment of lubrication and handwheel extensions without modifying the gearcase. And vertical and circumferential lubricant grooves completely frame the port openings, preventing leakage.

These are just some of the features that make Walworth LPV's better. For additional information, write Department G-5.

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NACE, North Central Region Conference, Pfister Hotel, Milwaukee, October 19-20.

NACE, South Central Region Conference, Mayo Hotel, Tulsa, October 25-27.

NGAA, Southern Regional Meeting, Carlton Hotel, Tyler, Texas, October 28.

November

NACE, Canadian Region Eastern meeting, Sheraton Mount Royal Hotel, Montreal, Quebec, November 14-16.

API, annual meeting, Palmer House Conrad Hilton and Congress Hotels, Chicago, November 14-16

NGAA, Panhandle Plains Regional meeting, Herring Hotel, Amarillo, Texas, November 18.

ASME, winter annual meeting, Statler Hilton, New York, November 27, December 2.

1961

January

Pipe Line Contractors Association, annual meeting, Fairmont and Mark Hopkins Hotels, San Francisco, January 15-18.

NGAA, Gulf Coast Regional meeting, Robert Driscoll Hotel, Corpus Christi, Texas, January 20.

March

ASME, Gas Turbine Power Division, co-sponsored by the Department of Defense, sixth annual conference and exhibit, Shoreham Hotel, Washington, D. C., March 5-9.

NACE, seventeenth annual conference, Hotel Statler, Buffalo, N. Y., March 13-17.

April

PIEA-PESA, annual meeting, Galveston, Texas, April 11-13.

Southern Gas Association, annual convention, New Orleans, April 24-26.

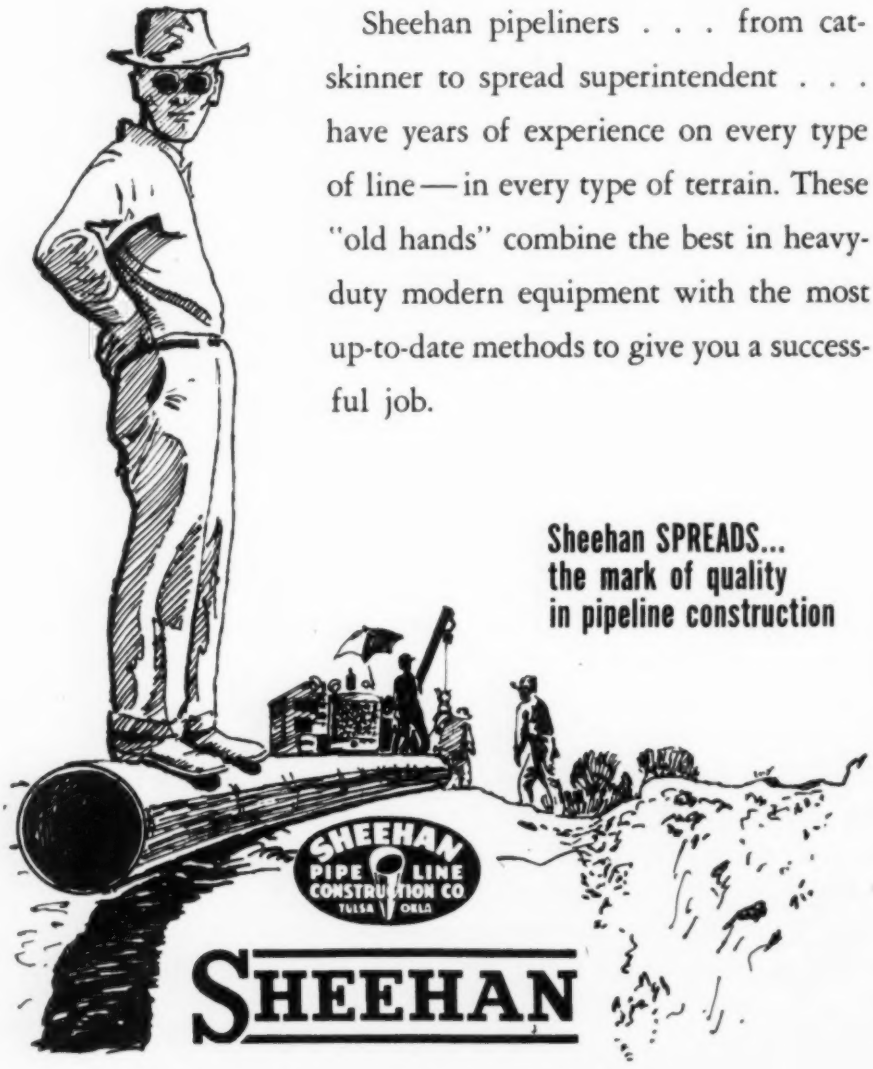
API, Division of Transportation, annual meeting, Chase Park Plaza Hotel, St. Louis, Mo., April 26-28.

May

AGA, Transmission Section, annual meeting, Brown Palace, Denver, May 25-26.

pipeliner . . .

. . . the "make-or-break" factor in pipelining



Sheehan pipeliners . . . from cat-skinner to spread superintendent . . . have years of experience on every type of line — in every type of terrain. These "old hands" combine the best in heavy-duty modern equipment with the most up-to-date methods to give you a successful job.

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SHEEHAN

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BOOKS

1959 Research Highlights of the National Bureau of Standards (Annual Report), U.S. Department of Commerce, Washington 25, D. C., 55 cents.

This illustrated report brings together the most important developments in the research program of the Bureau during 1959. It describes a wide range of scientific studies, laboratory experiments and instrument developments arising from the Bureau's responsibility to provide leadership in the science of measurement. The report will be of interest not only to the research scientist, engineer and technologist, but also to scientific and industrial management.

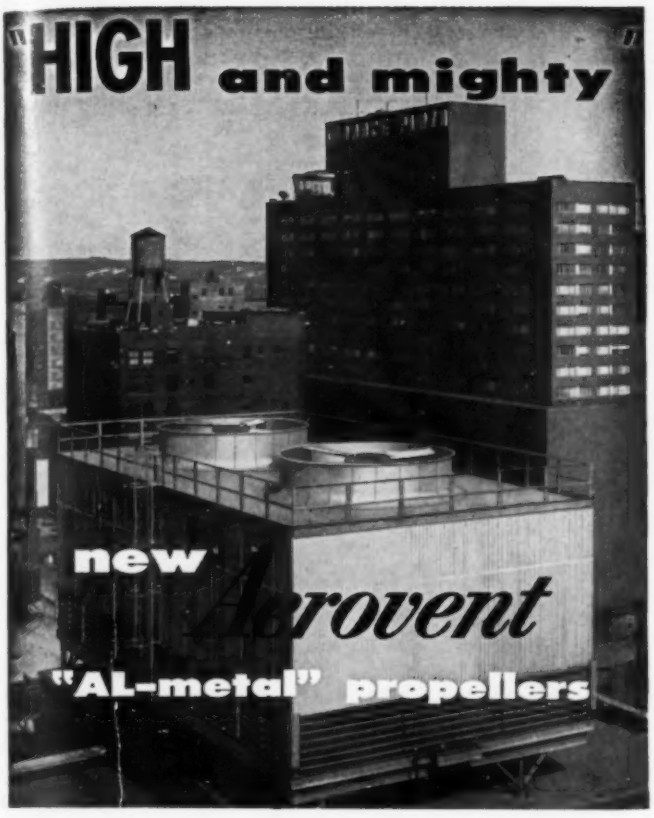
Much of the material is concerned with the requirements of the space age: research on properties of materials under extremely high pressures and temperatures, measurement methods and standards for extreme pressures and temperatures, calibration of vibration measuring instruments, precise measurement of shock wave properties, measurement of the heat conductivity of explosives and solid propellants.

The Years Ahead—1960-75, American Marietta Company, Chicago, Ill.

This 40-page booklet summarizes a year-long study to project our nation's economic outlook, particularly as it relates to expanding markets, research and development, and the growth opportunities ahead for industry. The report puts the analytical spotlight of economic research upon three salient factors: population increase, construction boom, and unprecedented technological progress.

Here are some of the major conclusions of the 15-year period forecast. The economy of 1975 will be nearly the equivalent of two American economies of today. The gross national product now totals approximately $480 billion a year. By 1975, the gross national product will reach $925 billion.

Average family income now is $6,480 a year. By 1975, this average will have increased at least 50 percent to an average of $9,400 annually.



move mountains - of AIR!
in towers and exchangers

Developed originally for the petroleum industry, Aerovent Large-Diameter "Al-metal" Propellers, constructed of tough, durable aluminum alloy, move great quantities of air at high velocities, in heat exchangers and cooling towers. Pictured above are two 4-blade, 16-ft. propellers in a cooling tower installation. These mighty propellers, with adjustable-pitch "Macheta" Airfoil blades, are job-engineered to individual specifications.

- **Sizes 14′ to 18′**
- **4 or 6 blades**

Write for free Bulletin 510

DESIGNED FOR DEPENDABLE OPERATION!

Endurance tests, conducted at *3 times* normal loading prove the ability of these new large-diameter propellers to withstand severe punishment. Heavy-duty cast steel hubs offer maximum resistance to stresses. Angle settings for each operating requirement, and appropriate alternate settings, assure accurate pitch for any predetermined performance which may be required. 54″ to 144″ now available in Adjustable Pitch Models.

REFINERIES, pumping stations, industrial plants and commercial buildings use Aerovent "Al-metal" Propellers in major air-moving applications.

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standard meter tubes

Here's just the ticket for minimum-cost metering stations . . . Daniel Orifice Flange Standard meter tubes. Used where frequent plate inspection is unnecessary, these units provide completely reliable flow measurement. Daniel orifice flanges are precision machined from the finest materials available to meet current AGA, ASA and ASME requirements. Each standard tube is shipped complete with a bored and polished stainless steel orifice plate, bolts or studs, jackscrews and steel pipe plugs. See your Daniel representative for full details.

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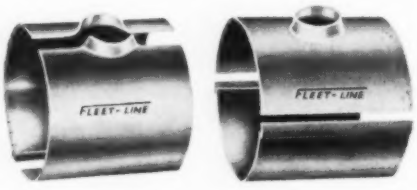
SADDLES: Conventional, and for pressure vessel heads. Nozzle sizes from ¼" to 24". Fleet-Line saddles weld neatly into place in much less time, and with much less welding rod.

Full encirclement saddles.



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Dealers and Stocking Distributors throughout the United States and Canada.

All orders acknowledged by air mail or long distance telephone and filled at once.

STEEL FORGINGS, Inc.

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What's Happening among SERVICE and SUPPLY MEN

International Harvester Co. Elects Bradley Vice President

Robert B. Bradley has been elected vice president and executive head of International Harvester Company's Construction Equipment Division. Bradley, also president of International Harvester Company of Canada, Ltd., succeeds Harald T. Reishus, retired.

Robert B. Bradley

Bradley has been with the company since 1929, and in 1954, he was elected top executive of the Canadian company. Reishus had been with International since 1923, and was elected a vice president in 1953.

Cal-Metal Pipe Corp. Names Johnston Assistant Sales Manager

Robert E. Johnston, Jr., has been appointed assistant sales manager of Cal-Metal Pipe Corporation of Louisiana. He joined the company in 1957, and served as southern district sales manager.

Dick A. Hall has been named a sales engineer with headquarters in Baton Rouge. Prior to joining Cal-Metal he had been with a pipe line company developing welding specifications.

Centriline Corporation Appoints Arthur S. Hicks District Manager

Centriline Corporation has appointed Arthur S. Hicks district manager for the Philadelphia area. Formerly manager of water line sales for the Dresser Industries, Inc., Hicks is a registered professional engineer in Pennsylvania and a member of the ASCE and American Water Works Association.

Johnson, Seiler Named Officers of Petroleum Equipment Suppliers Assoc.

Elliott Johnson has been named president and John G. Seiler vice president of the Petroleum Equipment Suppliers Association. Johnson is vice president-finance and general counsel of the Schlumberger Well Surveying Corporation, and Seiler is president of Tube Turns, division of the Chemetron Corporation.

Johnson has been with Schlumberger since 1936, and Seiler has been with Tube Turns since 1930. He became president in 1956.

Caterpillar Tractor Co. Promotes Ely, Swardenski

Lloyd J. Ely has been appointed vice president of the foreign trade group and Gordon Swardenski becomes director of manufacturing for domestic operations for Caterpillar Tractor Co.

Ely formerly held the position Swardenski assumes. He joined the company in 1916. Swardenski, who has been with Caterpillar since 1930, has been assistant manager of the Peoria plant since 1957.

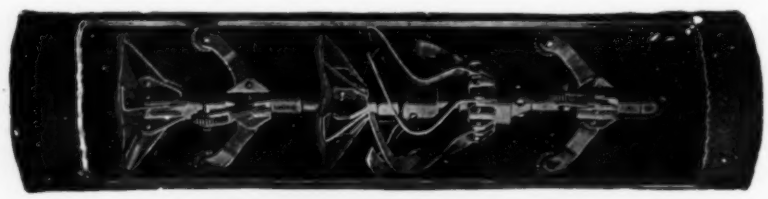
Big Inch Pipe Mill Begins Operations in Calgary, Alberta

Canada's large diameter pipe mill was opened last month in Calgary, Alberta. The Big Inch Pipe Corporation is designed to manufacture 18 to 36-inch pipe. The building which houses all manufacturing facilities, is 580 feet long by 90 feet wide, with an additional 200 feet of external craneway for loading of finished pipe and unloading of raw material.

Planned capacity of the plant operating on two-shift schedule is 120,000 tons annual output of pipe. One of the main features of the plant is its continuous mill line without using U-ing and O-ing presses.

Frank W. Murphy Names Frakes Houston Manager

Frank W. Murphy Manufacturer, Inc., announces the appointment of Sidney Frakes as manager of the Houston branch operation of the Tulsa based firm. Increased activity in the Texas area brought about the need for the branch office.

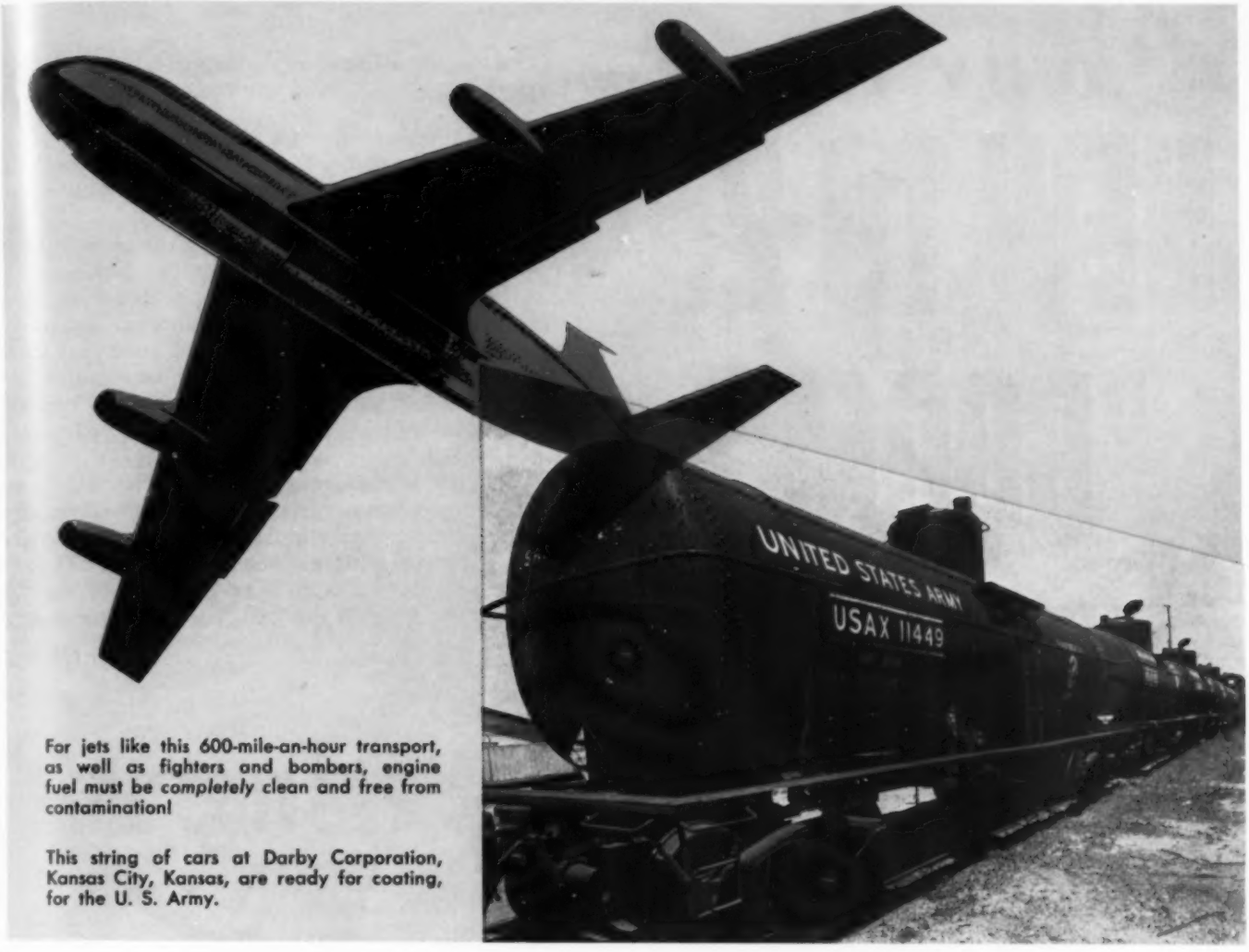


THE GO-DEVIL — READY TO GO!

Partly compressed guide arms and knives are held tight but flexible against pipe walls by pressure of individual springs. Guide arms keep scraper in line, eliminating undue driver wear and prevents cocking. Flexibility permits Go-Devil to round bends.

Go-Devil

G. A. COTTEN CO. P. O. Box 5332 Tulsa, Oklahoma



For jets like this 600-mile-an-hour transport, as well as fighters and bombers, engine fuel must be *completely* clean and free from contamination!

This string of cars at Darby Corporation, Kansas City, Kansas, are ready for coating, for the U. S. Army.

Cook's Helps Keep Jet Planes Flying Safely... with EPOXY TANK-CAR COATING PROCESS

Jet engines are sensitive! — they can't stand any contamination in their fuel. To make sure the tank cars that carry jet fuel (or aviation gasoline or any similar fluid) are contamination-free, they need special inside coating. Here's how famous Darby Corporation, specialists in tank-car maintenance, uses Cook's products to provide this contamination-free protection:

Step 1: After all required repairs are made, inside of car is given a commercial-grade sand blast. Blast fines are vacuumed from tank.

Step 2: Interior surface is sprayed to thickness of 7 to 9 mils wet (3½ mils dry-film) with Cook's 836-R-9 Epoxy Coating, and forced hot-air cured at 150° F. for six hours.

Step 3: Over the first coat goes a second of Cook's 920-A-221 Epoxy. Same wet and dry film thickness of first coat, which provided a total dry-film thickness of at least 7 mils. After drying, the car gets final inspection for delivery to customer.

For this special tank problem, Darby turned to Cook's for the correct coatings — and Cook's cooperated to help Darby get the perfect, "no-tolerance" results.

Cook's 836-R-9 and 920-A-221 epoxy coatings have been proved in performance all over the world in aviation and jet fuel service. They meet Government Specification MIL-C-4556A, Fuel and Water Resistant Coating for Aviation Gasoline and Jet Fuel Service. Their spray-ability and pot life are excellent.

You, too, have coating problems — of various kinds. Turn to Cook's for the experienced help of our coatings engineers and chemists. They can help analyze your paint problems, provide specific product data sheets and prepare specifications for you or your contractor. Write, wire or telephone.

SEE OUR CATALOG IN PIPE LINE CATALOG
OR SEND FOR A COPY

COOK'S PAINTS

COOK PAINT AND VARNISH COMPANY

KANSAS CITY
P. O. Box 389
GRand 1-4800
Teletype KC584

DETROIT
P. O. Box 5507
UNiversity 1-1000
Teletype DE293

HOUSTON
P. O. Box 3089
CApitol 8-2391
Teletype HO29

For more data on advertised products, use Readers' Service Cards, last page.

ONLY THE NEW TD-25 "BOOM" GIVES YOU

Now—International Superior announces the new TD-25 sideboom.

Now, you get the pipe-handling wallop of 230 direct-started, turbocharged Diesel hp. *Plus* the exclusive teamwork of "live track" Planet Power-steering and Hi-Lo power-shifting!

"Live power" on both tracks full time, with fingertip speed control of either track, lets you turn smoothly with the pipe load, upgrade or down. Load-limiting "dead-track drag" is eliminated. And you can power-shift the "25" up or down, on-the-go, in forward or reverse. *TD-25 standard equipment gives you pipe-handling maneuverability that no king-sized clutch-steered crawler can deliver, even with costliest attachments!*

The "25" is platformed on new 7-roller tracks with double-box-beam frames. This design assures super undercarriage strength for slam-bang conditions—*plus* mud-and-mountain beating flotation and stability. Heavy-duty TD-25 Dura-Rollers defy the pipelining "grind"—with the industry's thickest shells, to

Planet Power-steering and

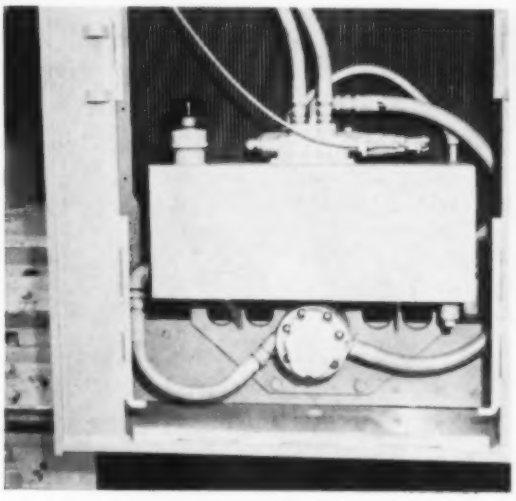
New International Superior TD-25 Sideboom lifts 130,000 lbs. at 4' overhang. Six quick-change counterweights with big lifting eyes save 60 to 90% on time needed to adapt rig for any "lift" or "carry." Unit is powered by the 6-cylinder, direct-start DT-817 Diesel—developing 230 high-torque hp!

prevent flexing—positive grit-exclusion—and 1,000-hr-interval lube capacity!

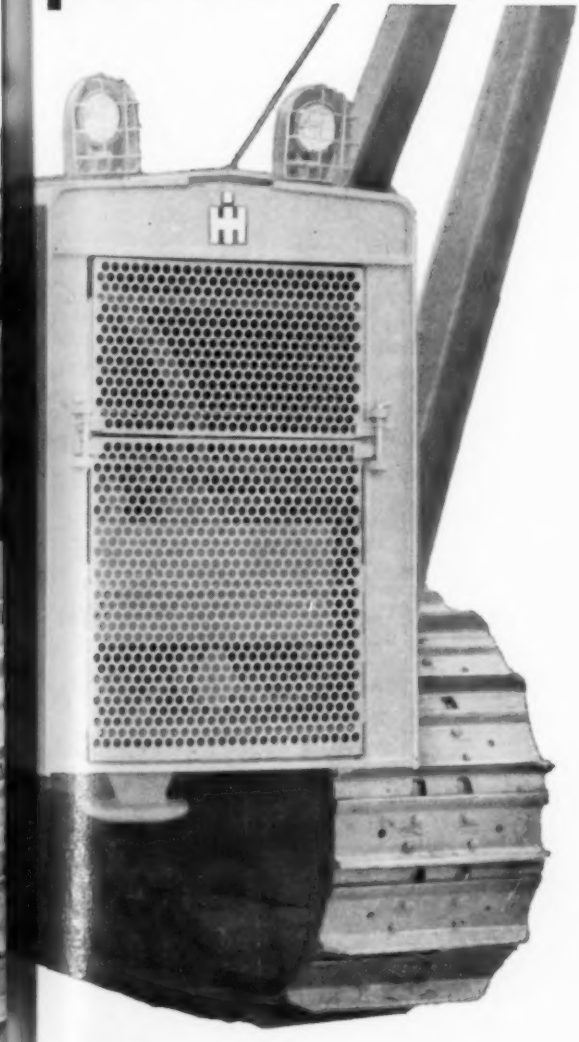
No wonder new TD-25 sidebooms can "show other makes how," installing difficult sections—beating toughest weather and terrain—saving time with accurate lowering and gate-valve positioning—leap-frogging at speeds up to 7.7 mph. New "25" sidebooms give your whole spread new pipe-laying capacity, all the way!

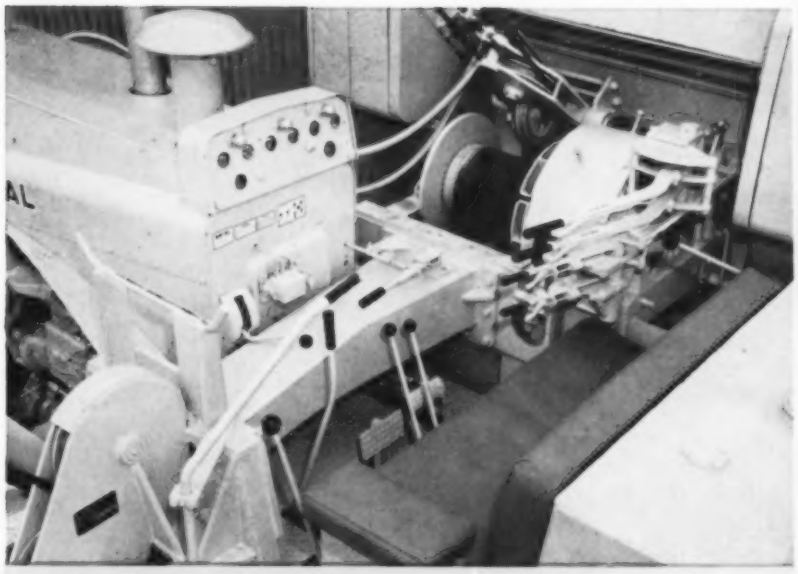
Power-steer and power-shift the new TD-25 sideboom—compare what it means to get the exclusive, double-barreled advantages of Planet Power-steering and Hi-Lo power-shifting *as standard equipment*. Compare new TD-25 sideboom capacity, operating ease and economy. See your International Superior Distributor for a demonstration.

New TD-25 sideboom hydraulic system features increased capacity, and exclusive new accessibility. Step-up in hydraulic power speeds boom action—while retaining famous International Superior sideboom slip-proof, inch-close, pipe-handling accuracy. To service this protected hydraulic system, simply unlatch radiator-guard door!



d power-shifting, as standard!





Note the safe, comfortable, production-practical operator's compartment! Read-easy instrument panel is at eye level. Reach-easy boom-control levers are vertically stacked. New fleeting sheave is provided over boom drum—another big contribution to high availability and long cable life!

International Harvester Company, Chicago 1, Illinois

INTERNATIONAL®

SUPERIOR

Panellit Appoints Miller Baton Rouge Office Manager

Panellit, a division of ISI, Incorporated, has appointed Alfred E. Miller, as head of the company's New Baton Rouge, La., office. Miller has been a sales application engineer.

Officers Installed by Natural Gasoline Supply Men's Association

Natural Gasoline Supply Men's Association has installed officers and board members. New officers are Ray F. Riddle, Riddle & Hubbell Co., president; C. P. Stanley, Dresser Engineering Co., first vice president; F. W. Bell, Brown & Root, Inc., second vice president, and W. M. Gebo, Ingersol-Rand Co., treasurer.

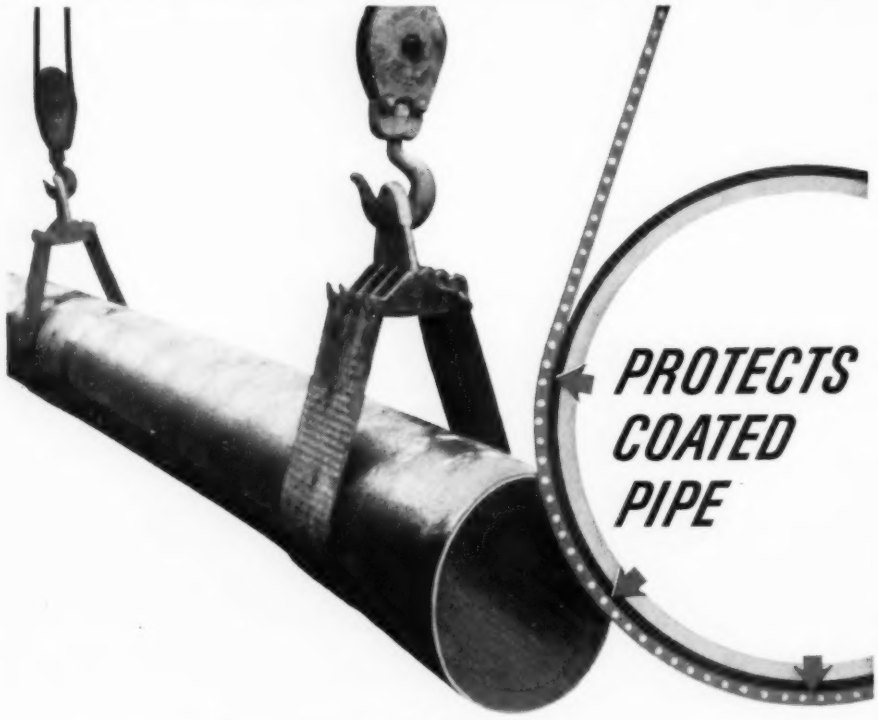
Continental Oil Co. Acquires Plastics Company Interest

Continental Oil Company has acquired a 25 percent interest in a plastic pipe producing company—Carlon Products Corp. of Aurora, Ohio, near Cleveland.

John G. Van Bosse Promoted By Automatic Electric Laboratories

John G. Van Bosse has been named supervisor of electronic switching systems design and development for Automatic Electric Laboratories. He replaces Richard C. Stiles, who joined the staff of General Telephone & Electronics Laboratories, Inc.

Van Bosse joined the company in 1957, as project engineer and has worked in research and development of electronic crosspoint switching.



THE C-R-C PIPE SLING

- **SAFE:** Sling has no humps or projections to dig into surface of coated pipe.
- **THIN:** Only 5/8" thick. Ideally suited for narrow ditches.
- **STRONG:** Tested lifting capacity of C-R-C Pipe Sling* — up to 216,000 lbs.
- **FLEXIBLE:** Strong, steel-wire links enclosed in heavy-duty rubber give this husky sling flexible strength.
- **UNFASTENS EASILY:** Especially designed sling iron permits quick — easy, fastening and unfastening after pipe is in the ground.

** Patent applied for.*

SERVING PIPELINERS SINCE 1933

CRC

CRUTCHER · ROLFS · CUMMINGS, INC.

Home Office: Houston, Texas, Box 2073, OVerland 6-4301

Export Office: International Oil Equipment Co., 30 Rockefeller Plaza, New York, N. Y., COlumbus 5-6250
In Canada: Canadian Equipment Sales & Service Co., Ltd., 7310 99th St., Edmonton, Alberta, Canada

Clark Bros. Co. Announces Four Sales Appointments

Clark Bros. Co. announces the appointments of four sales representatives in the Houston-Corpus Christi area.

Stewart L. Babbitt was named sales engineer for the Houston office. He has been with the company since 1949, and served as Houston district service manager since 1957. G. M. Woodman, formerly small engine salesmen for Corpus Christi area, has been transferred to the Houston district. C. R. Apitz, formerly special representative, gas turbines, Dallas, has been assigned to the Houston office as senior sales engineer. F. J. Shaw, application engineer, Houston, becomes sales engineer for Corpus.

Stewart L. Babbitt

Rawson & Co. Opens Beaumont Sales Office

Rawson & Co. has opened a sales and service office in Beaumont, Texas, under the direction of William S. Knoble. Knoble had worked with Mobil Beaumont refinery in the Technical and Engineering Departments.

Grove Valve & Regulator Company Appoints Foreign Representative

Grove Valve and Regulator Company has appointed Ernest H. Rettig sales and service representative for South America. Rettig formerly was with El Paso Natural Gas Co. where he served as technical representative in the project engineering and pipe line construction departments.

He will be responsible for sales of Grove's complete line of valves in South America. His headquarters will be in Houston.

Ernest H. Rettig

Fred C. McDaniel Joins Decibel Products, Inc.

Decibel Products, Inc., announces the appointment of Fred C. McDaniel as sales engineer. With over 10 years experience in the field, McDaniel comes to the firm after serving with Communications Engineering Company and Motorola C. & E. He will be headquartered in Dallas.

Master Tank & Welding Names Pearson Sales Representative

Master Tank & Welding has appointed Harry Pearson sales representative. Pearson has had years of experience in the LP-Gas industry and petroleum and allied fields in the southwest. He had been a superintendent for a large oil concern in Texas and active in the LPG field in Oklahoma. He will cover North Texas and Oklahoma for Master Tank, specializing in transports, storage and local delivery and domestic tanks.

. . . in stock and ready for delivery from CURTIN

NEW ASTM SHORT CONE SHAPE BS&W TUBE

W. H. Curtin & Company has on hand complete stocks to fill your requirements in converting to the new Short Cone Shape BS&W Tube approved at the June 1960 meeting of ASTM Committee D-2. Standard ASTM 100-ml tubes or tubes graduated in 200 parts, hand and motor-driven centrifuges, plus all accessories needed for converting your present equipment are available at all Curtin locations. Curtin Bulletin CT-660-1 shows exactly what is required to convert each type of centrifuge now in use. **Ask your Curtin salesman or write W. H. Curtin & Co., Box 118, Houston 1, Texas.**

W.H. CURTIN & CO.

CURTIN

PETROLEUM TESTING EQUIPMENT

HOUSTON • DALLAS • TULSA • NEW ORLEANS
JACKSONVILLE • BIRMINGHAM • CORPUS CHRISTI
CURTIN DE MEXICO, S.A. DE C.V., MEXICO, D.F.

110

So SIMPLE that "Specials" are Likely to be Standard!

A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol

MAGNETROL

The World's Most Dependable

LIQUID LEVEL CONTROL

Because of the utter simplicity of Magnetrol's magnetic operating principle, standard models can be easily adapted to meet any special requirements for pressure, temperature or corrosive liquids . . . and usually at little extra cost. This Magnetrol versatility has solved all kinds of tough level control problems . . . and given our engineers wide application experience that can be invaluable to you.

Magnetrol is so simple that failure is all but impossible! Using only permanent, unfailing magnetic force for its operation, there's nothing to wear out . . . no diaphragms or bellows to stiffen and rupture . . . no electrodes to short or corrode . . . no packing to bind or leak. Magnetrol is practically maintenance-free! Magnetrol units are available for controlling level changes from .0025-in. to 150-ft. . . . with multi-stage switching when desired. Send coupon for full details.

MAGNETROL, Inc.

Send Coupon For Full Details

MAGNETROL, Inc., 2128 **S. Marshall Blvd., Chicago 23, Illinois**

Please send me catalog data and full information on Magnetrol Liquid Level Controls. 6

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

Terry W. Russell Joins International Controls

Terry W. Russell has joined International Controls Corporation as a vice president of sales and a member of the board of directors. Russell, who has been in the industry for 20 years, was one of the original members of the automation division formed by Dresser Industries where he was primarily interested in market research and sales.

Terry W. Russell

International Controls specializes in design and manufacture of "off-the-shelf" electronic equipment for data gathering and remote control of pipe line and production operations. Transistorized circuitry is used in most cases.

Hydromatics, Inc. Promotes Austin F. Platt to Sales Manager

Austin F. Platt has been promoted to national sales manager of Hydromatics, Inc. He had been regional sales engineer and later assistant to national sales manager for Hammel-Dahl division of General Controls Co. before joining Hydromatics. Prior to that, he was eastern regional sales manager, Robertshaw-Fulton.

N. A. Lee Guill

W. L. Clark

Chiksan Company Names Guill Eastern Regional Sales Manager

The Chiksan Company has appointed N. A. Lee Guill eastern regional sales manager with headquarters in Newark, N. J. He will be responsible for sales activities of factory field men and manufacturer's agents in the eastern half of the United States and Canada. Guill joined the company as a salesman in 1949. He succeeds J. F. Powers, Jr. who recently became vice president and sales manager of Chiksan Company.

W. L. Clark replaces Guill as senior sales representative in the Midwest. He will maintain Chicago headquarters.

Kaiser Steel Corp. Opens Sales Office in Albuquerque

Kaiser Steel Corporation has opened sales offices in Albuquerque, N. M., and appointed Keith W. Meserve sales representative in charge.

Meserve joined the company in 1955, and has been in the Denver office since 1959.

W-K-M Names Ventura Gate Valve Repair Shop

W-K-M division of ACF Industries, Incorporated, has appointed Ventura Tool Company an authorized repair shop for through conduit gate valves.

All valve repairs will be performed using same techniques as at the W-K-M factory, including hydrostatic testing.

Parsons Company Names Two Michigan Distributors

Parsons Company, Division of Koehring Company, has named two distributors in Michigan. Construction Equipment Company, Detroit, and O'Neil Equipment Company, Muskegon Heights, will sell and service the complete line of Parsons ladder and wheel-type trenchers.

Construction Equipment Company's territory includes eastern part of the state and O'Neil will cover the west.

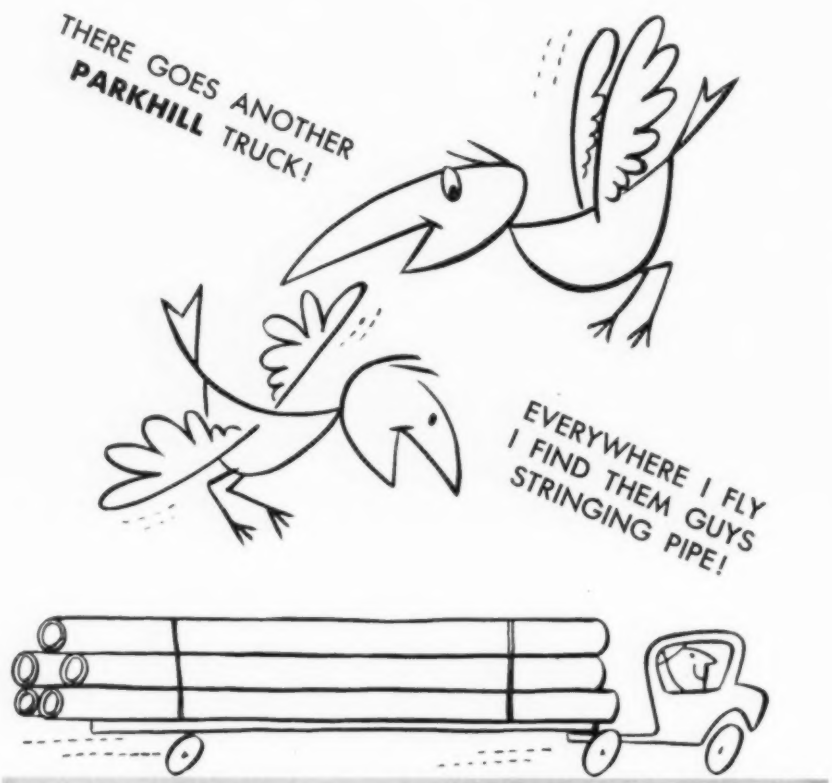
Brodie Names W. B. Kerr Midwest Division Manager

W. B. Kerr has been appointed manager of the Midwest Division of Ralph N. Brodie Company. He succeeds A. J. Weckler, who retired.

Kerr joined the company as a field engineer over five years ago, and was promoted to assistant division manager.

Ronald M. Roberts Appointed Atlanta Sales Representative

American Meter has named Ronald M. Roberts sales representative for the Atlanta sales district. He had been division measurement engineer for Houston-Texas Gas and Oil Corp. before joining the company. He recently completed the company's six month gas measurement school at their Erie, Pa., plant.



Anywhere . . . anytime!
Parkhill has the men, the equipment
and the experience to handle your next pipe
stringing job, large or small. Give us a call
and park your problems with Parkhill.

PARKHILL TRUCK COMPANY

POST OFFICE BOX 3807 • TULSA, OKLAHOMA

Keeping oil and gas *on the move*

Your Profit-Pipe is LIGHTWALL by SOUTHWESTERN

It gives you heavyweight performance for less money: lower initial cost, ease of installation, flexibility, greater flow-through and long trouble-free service.

SOUTHWESTERN gets your order on the way without delay . . .

keeping oil and gas on the move. We take pride in our fast, dependable delivery from large warehouse stocks. Southwestern makes a full range of sizes up to 4.500" O.D. in wall thicknesses up to .188 wall to meet almost every need and every joint is top performance quality.

Take a look at LIGHTWALL by SOUTHWESTERN...your Profit-Pipe

LICENSED BY
THE AMERICAN
PETROLEUM INSTITUTE

SOUTHWESTERN PIPE, INC.

P. O. BOX 2002 HOUSTON 1, TEXAS PHONE CAPITOL 4-0631

Construction Starts On Tex-Tube, Inc. Pipe Mill

Construction has begun on Tex-Tube, Inc.'s, third pipe mill at its Houston plant. The company, manufacturer of light weight line pipe, is undergoing a $1 million expansion program which includes a two-story office building, and additional plant facilities which were completed in 1959.

The 40,000 square foot building is Tex-Tube's third electric resistance welding pipe mill. The new mill will have an average capacity of 2,000 tones of pipe per month. The structure includes a variety of handling equipment, normalizing furnaces and an overhead 15-ton crane.

General Electric Appoints Gaffney Sales Representative

Paul G. Gaffney becomes east central district sales representative for General Electric Company's Metallurgical Products Department. He will be headquartered in Dayton, Ohio.

Sesler & Associates, Inc. Names Harold A. Dresser Manager of Sales

Harold A. Dresser has been appointed manager of sales for Sesler & Associates, Incorporated, Engineers and Constructors. The firm formed Thermodynamics Equipment Company as a subsidiary with Dresser as manager for sales of heat generation and exchange equipment.

R. B. Wallace

Woodrow Cole

Jackson Supply Co. Appoints Vice President and Treasurer

The recently formed M. H. Jackson Pipeline Supply Company has appointed a vice president and treasurer. M. H. Jackson is president of the Tulsa firm, R. B. Wallace was named vice president and Woodrow Cole has been appointed treasurer.

M. H. Jackson

Jackson has had extensive service in the supply industry. Wallace will concentrate his efforts on products sales, plus new product acquisition and production. Cole also will serve as office manager.

Willis Oil Tool Co. Relocates Main Office

Willis Oil Tool Company has relocated its headquarters in Long Beach, Calif. Formerly the company was located at 3440 Pine Avenue in Long Beach. The offices were moved to 2451 Palm Drive in Long Beach.

The plant-office building covers 15,000 square feet.

Amour Alliance Industries Open New Adhesives Plant

Amour Alliance Industries has opened a newly-constructed industrial adhesives plant in Philadelphia. The new plant will service industrial adhesive customers throughout the Eastern United States.

With 15,000 square feet of floor area, the plant is equipped to formulate several kinds of adhesives.

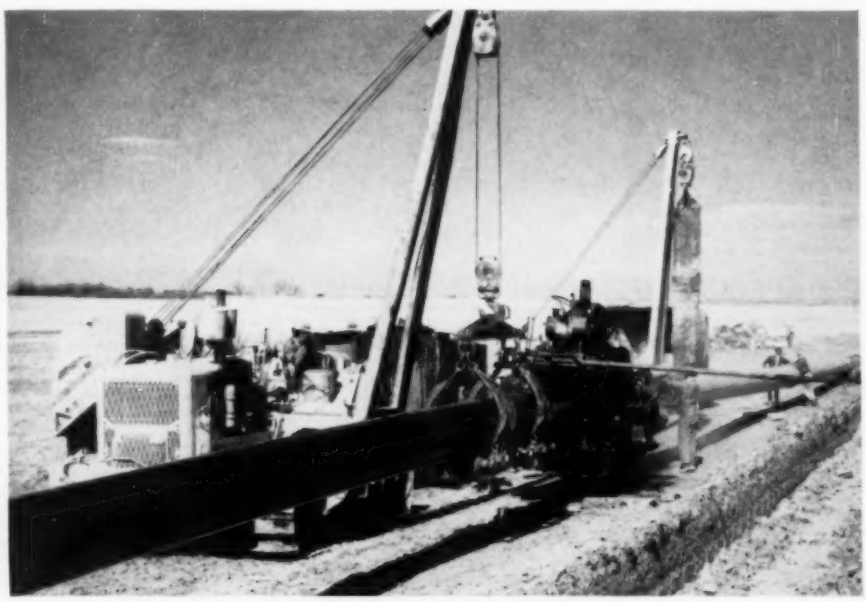
B-I-F Industries Elects R. P. Lowe Vice President

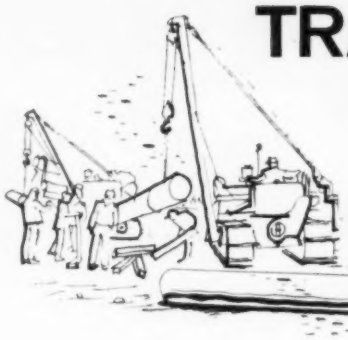
Rudy P. Lowe has been elected vice president of B-I-F Industries. He has been with the company since 1932 and he will continue his present duties as director of industrial systems sales for the company.

Smith-Dannemiller Form New Electronics Company

Frank C. Smith and J. R. Dannemiller have established a new manufacturers' representative firm, Dannemiller-Smith, Incorporated. Smith is president of the company with headquarters in Houston and Dannemiller is vice president with headquarters in Dallas.

Smith formerly was with Southwestern Industrial Electronics. Covering Texas, Louisiana, Arkansas and Oklahoma, the firm will handle industrial electronic instrumentation.





TRANSWESTERN IS BUILDING FOR ENDURANCE!

The Transwestern Pipeline Company line, with 1600 miles under construction from Fort Stockton, Texas and the Texas Panhandle to near Needles, California, will serve West Coast consumers with natural gas for many, many years to come. Its underground lines and structures are being installed with coal-tar enamel coating for high integrity electrical insulation and life-long corrosion protection. Reilly Hot Service Enamel with HS X-10 Primer and Reilly Intermediate Enamel with Q.D. Primer have been specified along with Coal Tar Enamels of other manufacturers and will serve as the engineering material of choice for corrosion mitigation.

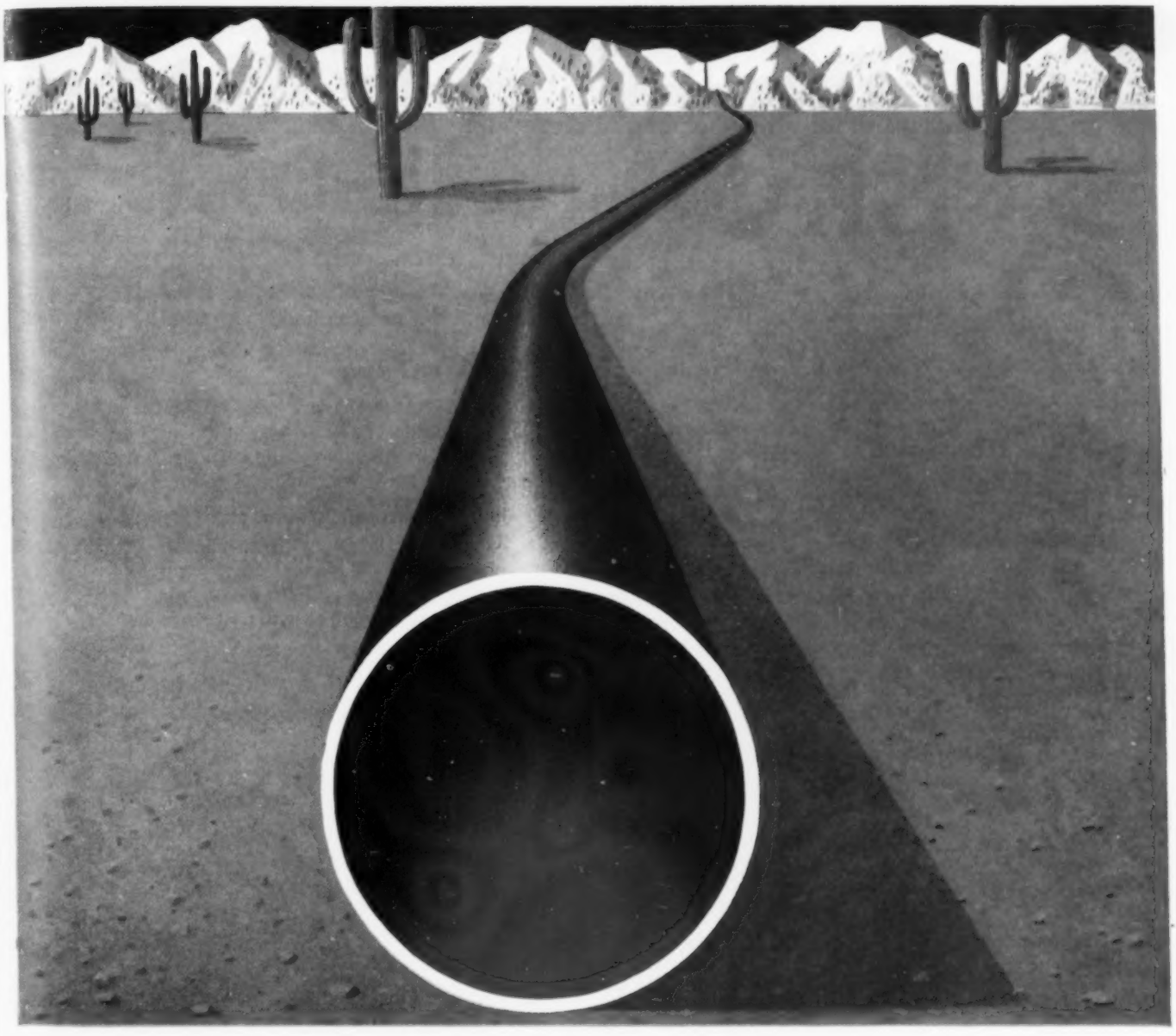
Reilly COAL TAR PRODUCTS

ARMED Protective Coatings

REILLY TAR & CHEMICAL CORP.

1615 Merchants Bank Building

Indianoplis 4, Indiana



ALLIED CHEMICAL'S HOTLINE ENAMEL

defies 180°F. heat without sliding and −10°F. cold without cracking

Allied Chemical Hotline Enamel's resistance to both high and low temperatures, as well as its greater durability, compared to asphalt base and other coatings, has been proved by laboratory tests, and on-the-job performance for leading public utility companies. Allied Chemical Hotline Enamel is derived from coal-tar pitch, thus possessing inherent protective properties against the damaging effects of water, soil chemicals and electrical currents.

Improves protection under these specific conditions:

1. On pipe-type cables or "oil-o-static lines" which are subject to internal electrical heat from high-voltage surges.
2. Hot gas pipelines, on discharge side of compressor stations where line is above 120°F.
3. Warm, swampy areas or other places where excessive soil stress is encountered.
4. Areas where backfill and trenches are rough, rocky or contain objects which normally penetrate softer coatings.
5. Pipelines (such as heated fuel lines) where temperatures are constantly high most of the time, but do not exceed 180°F. or 200°F. for short term exposure.

A staff of field service experts are at your call to offer you technical assistance that can save you maintenance time and costs. **LAST WORD IN CORROSION PROTECTION.**

PLASTICS AND COAL CHEMICALS DIVISION
40 Rector Street, New York 6, N. Y.

Allied Chemical

For more data on advertised products, use Readers' Service Cards, last page.

New time multiplexing and remote
and reduce line requirements for

Five new basic time multiplexing systems—and a new remote index setting feature—add to the overall versatility of *Dur-O-Pulse* . . . give you advantages available in no other telemetering system.

With Time Multiplexing Units—

- You can transmit up to 15 signals either in one or two directions over a single channel.
- You can add intermediate stations without adding any additional transmission lines.

With Remote Set Index—

- Easy to set—set the index, push a button and the rest is automatic: a pulse whose duration is directly proportional to the value of the set point is transmitted to remotely located controllers.
- Can be used as part of a multiplexing system.

The *Dur-O-Pulse* system measures and transmits process variables such as pressure, temperature, flow, level, voltage, current, power and speed. It can send data quickly and accurately over all types of circuits.

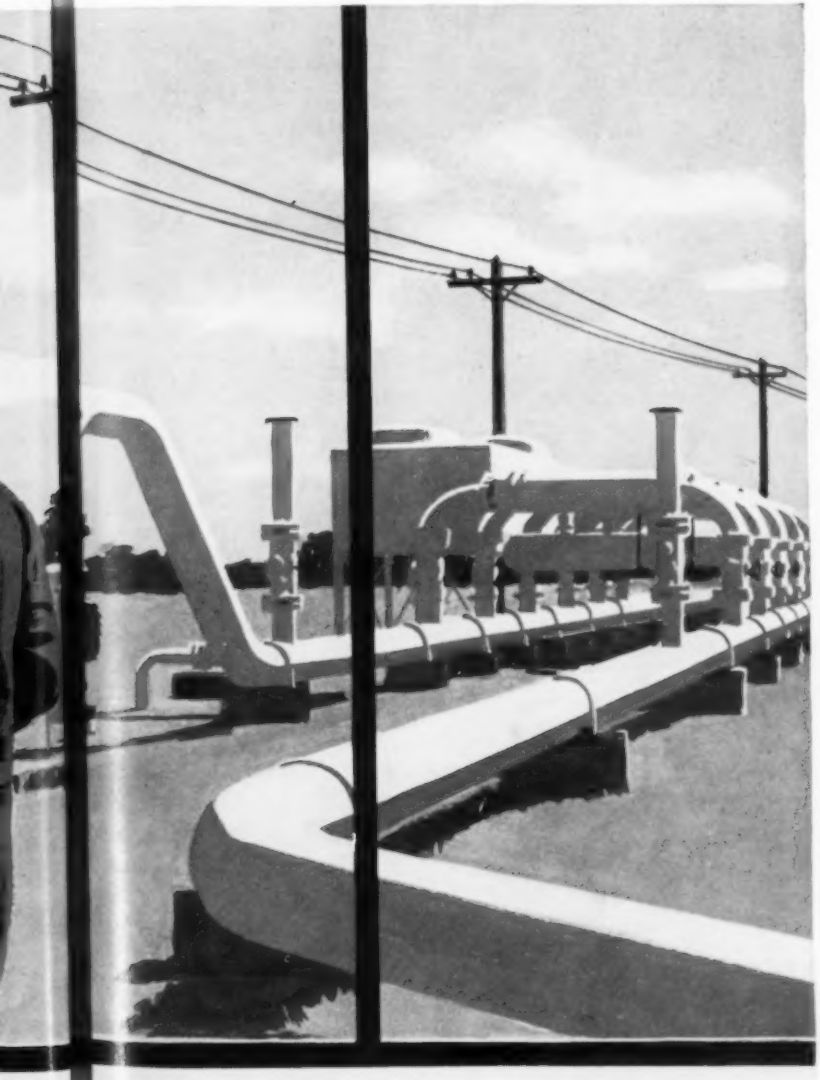
set index setting simplify operation

Dur-O-Pulse telemetering systems

- Gives you set point indication at transmitting and receiving instruments.
- A single tone is required for the index signal when audio tone multiplexing is used.

Find out about *all* the performance and maintenance advantages of *Dur-O-Pulse* from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.



REMOTE-SET INDEX TRANSMITTER eliminates separate push buttons or switches needed to drive controller index up or down scale. To readjust controller index it is necessary only to adjust the indicating pointer to the desired set point and push the start button.

TIME MULTIPLEXING UNITS transmit up to 15 variables in one or both directions and provide a synchronizing signal to keep transmitting and receiving units in step.

75th YEAR
PIONEERING THE FUTURE

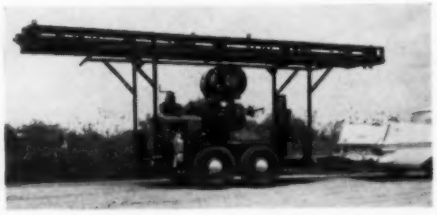
Honeywell

First in Control
SINCE 1885

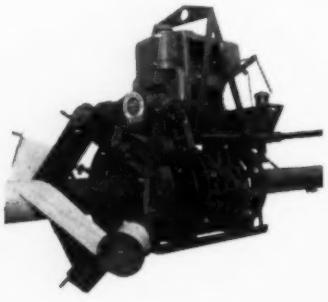
MYOCO...

For More Dependable Equipment and Service

HERE ARE MACHINES THAT BRING ADDED EFFICIENCY TO YOUR TAPING AND CLEANING AND TAPING.



The Myoco fully portable type stationary, semi-automatic, cleaning, priming and tape wrapping machine, is quickly and easily moved from one jobsite to another by passenger automobile or pick-up. Powered with air-cooled Wisconsin motors. Sizes 2" thru 6" inclusive.



MYOCO Model OW Power Driven Cleaning and Taping machine combines two operations for increased speed of operations with less equipment. Line travel machines are available to handle pipe sizes 3" to 6", 6" to 12", and 14" to 20". A Wisconsin Model Vg4D V-type 4-cylinder heavy-duty air cooled engine, combined with the design and engineering features of this machine, guarantees uninterrupted service.

When you use MYOCO pipeline equipment, you quickly find that servicemen are experienced and available twenty-four hours a day, with fast transportation available to serve you in any way; efficient equipment operation is assured by periodical checks; and if possible, parts and supplies are shipped the same day ordered.

MORRIS-YOUNG-OWENS CO. PIPELINE EQUIPMENT AND SUPPLIES MYOCO

MORRIS-YOUNG-OWENS CO.

PIPELINE EQUIPMENT AND SUPPLIES

P. O. Box 35137 • Houston 35, Texas
PArkview 3-0110

In Canada: MYOCO LIMITED, Rural Route 1, Midland Ave. N., Agincourt, Ontario, Canada. Tel. WA 2-9444

General Electric Company Promotes Glenn R. Petersen

Glenn R. Petersen has been appointed manager of marketing for General Electric Company's Communications Department.

Petersen joined the company in 1950, and for four years worked in product planning, sales analysis, sales planning and marketing development for special products operations. He moved to the specialty Control Department in 1954, and in 1957 became manager of program control sales.

Greensward Elected President Of Canadian Allis-Chalmers Limited

J. D. Greensward has been elected president of the Canadian Allis-Chalmers Limited, an Allis-Chalmers subsidiary. He succeeds Harold M. Schudt who becomes director of manufacturing, Allis-Chalmers International.

Greensward joined the company in 1922, and had been director of manufacturing, Industries Group, and a vice president of Allis-Chalmers since 1952. He will be in charge of heavy machinery operations in Canada which include manufacturing plants at Lachine, Quebec, St. Thomas, Ontario, and sales offices in major Canadian cities.

Frank Wheatley Companies Announce Major Expansion

Frank Wheatley Corp., and Frank Wheatley Pump & Valve Mfr., announce the appointments of five men to key positions in United States and Canada.

J. S. Tayrien has been named head of valve sales in the Permian Basin, Odessa, Texas, for Frank Wheatley Corp. Ken Sutton has been named special sales representative for mechanical rubber goods and miscellaneous fittings in Oklahoma territory with Frank Wheatley Corp. Wheatley Pump and Valve named John Greeley head of traveling sales promotion. Also, Orbie Sumner was made chief pilot and service manager, heading international services and engineering. Don R. Jepson was appointed head of Wheatley-Tayloe, Ltd., Calgary.

Jones & Laughlin Supply Division Appoints Five Field Representatives

Jones & Laughlin Supply Division announces the appointment of five field salesmen. H. D. Witt is salesman at El Dorado, Kan.; J. T. Webster becomes salesman at Williston, N. D.; A. B. Edwards was named salesman at Healdton, Okla.; B. J. Rust is assigned to Big Spring, Texas, and V. I. Ginther has been appointed to Tulsa sales.

Ginther had been salesman at Hill City, Okla., and Rust was located at Anson, Texas, previously. Webster and Edwards formerly were in Tulsa and Witt had been store manager at El Dorado.

Controller Institute of America Elects Roscoe S. Newman a Member

Roscoe S. Newman, secretary and treasurer of Pipe Line Service Corp., has been elected to membership in the Controllers Institute of America.

Vaughan Named Marketing Vice President by SIE

Robert O. Vaughan has been appointed vice president—marketing for Southwestern Industrial Electronics Co. Other SIE appointments include two managers in the Marketing Department and two engineering appointments.

Robert O. Vaughan

W. A. Laukaitis has been named eastern regional marketing manager; E. S. Turner becomes northwest regional marketing manager; Bernard W. Eades is now manager of value engineering, and Hugh A. Young has been appointed western engineering consultant.

Vaughan had been western regional manager of government operations for Dresser Industries, Inc. His 20 years experience includes association with RCA, The National Aircraft Corporation and Hoffman Laboratories. Prior to joining SIE, Eades had been manager of value engineering for Stromberg-Carlson of Rochester, N. Y. Turner served as district manager for Colorado Springs office of Stromberg-Carlson before joining the company. Laukaitis comes to SIE from W. L. Maxson Corporation's Washington office. Formerly a technical marketing consultant, Young also has had experience working with Motorola, DuMont Labs, and Packard Bell Electronics.

Kenneth W. Jones Appointed Manager of Tejas Plastics

Kenneth W. Jones has been appointed sales manager for Tejas Plastics Materials Supply Co. He joins the company after 15 years service in sales.

For the past three years he has been sales manager of a Houston firm.

CLASSIFIED ADVERTISING

Distributors Wanted

50-year old rubber manufacturer seeks distributors now calling on pipe line industry. Product is pipe wrap putty tape which is used to improve effectiveness of regular plastic overwrap tapes.

Product enjoying excellent repeat sales in areas where introduced, and we are now looking for additional distribution.

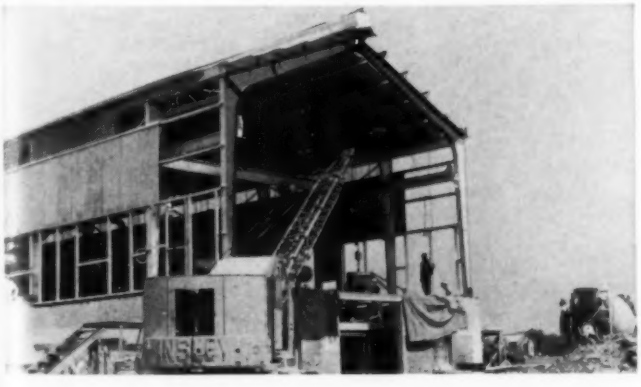
WEST AMERICAN RUBBER COMPANY
410 North Avenue 19
Los Angeles 31, California

LATEX

AGAIN AND AGAIN

REPEATING BUSINESS=LATEX

EFFICIENT — DEPENDABLE — QUALIFIED



Yes, repeating business and *LATEX* go hand in hand. For over one quarter century LATEX has been serving the oil and gas industry. Invite us for your next construction job.

In addition to pipe lines *LATEX* offers an experienced organization for STATION CONSTRUCTION AND ALLIED WORK.

REMEMBER, LATEX QUALITY BRINGS REPEAT BUSINESS "AGAIN AND AGAIN"

LATEX CONSTRUCTION COMPANY

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What's New in EQUIPMENT

Cooling System

A cooling system for non-radiator cooled engines, FLO-MATIC, has been developed by International Harvester Company. Recommended for all heat-exchanger International engines, FLO-MATIC control provides an efficient coolant system obtainable under all operating conditions.

The unit maintains a high-volume, high-velocity coolant flow, producing more uniform engine temperatures. Hot spots and steam pockets are eliminated and foaming and air entrainment problems are controlled. The system is available for the International V-8 engines—UV-401, UV-461 and UV-549 and three six-cylinder engines—UR-372, UR-450 and UR-501. Other engines will be included.

For more data, circle **No. E1** on Readers' Service Card, last page this issue.

Rectifier Chargers

A new group of two-way rectifier chargers to use with most stationary batteries, has been developed by Exide Industrial Division of the Electric Storage Battery Company. The chargers can be used with 6 to 60-cell batteries for stand-by power for emergency lighting, starting engines, fire alarm, etc. Operating on 110 or 220-volt, single-phase, 60-cycle alternating current, the chargers' electrical rectifying elements convert the alternating-current directly to the direct-current required for charging.

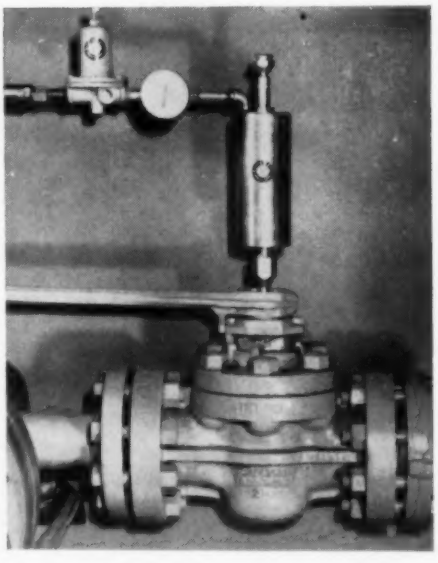
For more data, circle **No. E2** on Readers' Service Card, last page this issue.

Portable X-Ray

Design changes on the Baltograph 300 portable X-ray unit are announced by Bailteau Electric Corp. The unit is now offered in 360 degree X-ray tube which allows circumferential radiography as well as single beam use. It is also offered in lighter weight than the original machine, reducing from 150 to 136 pounds.

The Baltograph has a power rating of 300-KVP-3 MA, and a penetration capability up to 4-inch steel. Control panel includes a penetration meter, penetration selector, MA control, and automatic reset timer operated by push buttons.

For more data, circle **No. E3** on Readers' Service Card, last page this issue.



Valve Lubricator

Rockwell Manufacturing Company has developed an automatic valve lubricator to provide lubricated plug valves with a continuous regulated supply of lubricant. It is particularly applicable for remote valve installations where controlled and automatic lubrication in a necessity; it can be set to furnish lubricant only when the valve requires it.

Features include a built-in indicator and remote control operation. Unit can be equipped with a limit switch which triggers a warning system on a panelboard at remote control stations. All working parts made of aluminum, the lubricator weighs only two pounds.

It consists of three basic parts—piston, cylinder and lubricant chamber. Either air or gas not exceeding 250 psi inlet pressure to the pressure regulator can be used to operate the lubricator.

For more data, circle **No. E4** on Readers' Service Card, last page this issue.

Tractor Attachment

Self-cleaning blower fans for the D8 tractor and 583 pipelayer have been made available by Caterpillar Tractor Co. The attachment is an 8-blade fan with a rim attached to the blade ends, a disc attached to the center and 32 equally spaced spokes attached to the rim and center disc.

As the fan rotates, spokes form a guard which deflects particles of leaves and vegetation which would otherwise clog the radiator core and restrict cooling. There is no restriction of air movement.

(This item supplements Caterpillar Tractor Co. data on pages 76-79 of the Pipe Line Catalog, second revision).

For more data, circle **No. E5** on Readers' Service Card, last page this issue.

Pressure Regulators

A new line of compact, light-weight pressure regulators designed to handle a broad range of pressures, is being manufactured by Grove Valve and Regulator Company. Available for pressure reducing, back pressure and combination pressure reducing and relief service, the regulators are produced in sizes ¼-inch through ½-inch. They can be used for inlet pressures as high as 10,000 psi and adjustable controlled pressure to 6,000 psi. The Mity-Mite regulators are of gas controlled dome type, operating on the principle of balanced pressure with the valve action controlled by a pressure reaction chamber.

(This item supplements Grove Valve and Regulator Co. data on pages 213-224 of the Pipe Line Catalog, Second Revision.)

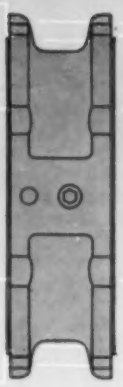
For more data, circle **No. E6** on Readers' Service Card, last page this issue.

Gas Analysis-Detection

To make it possible to distinguish pipe line gas from other surrounding gases, Gas Purifying Materials Company has developed a new Analograph.

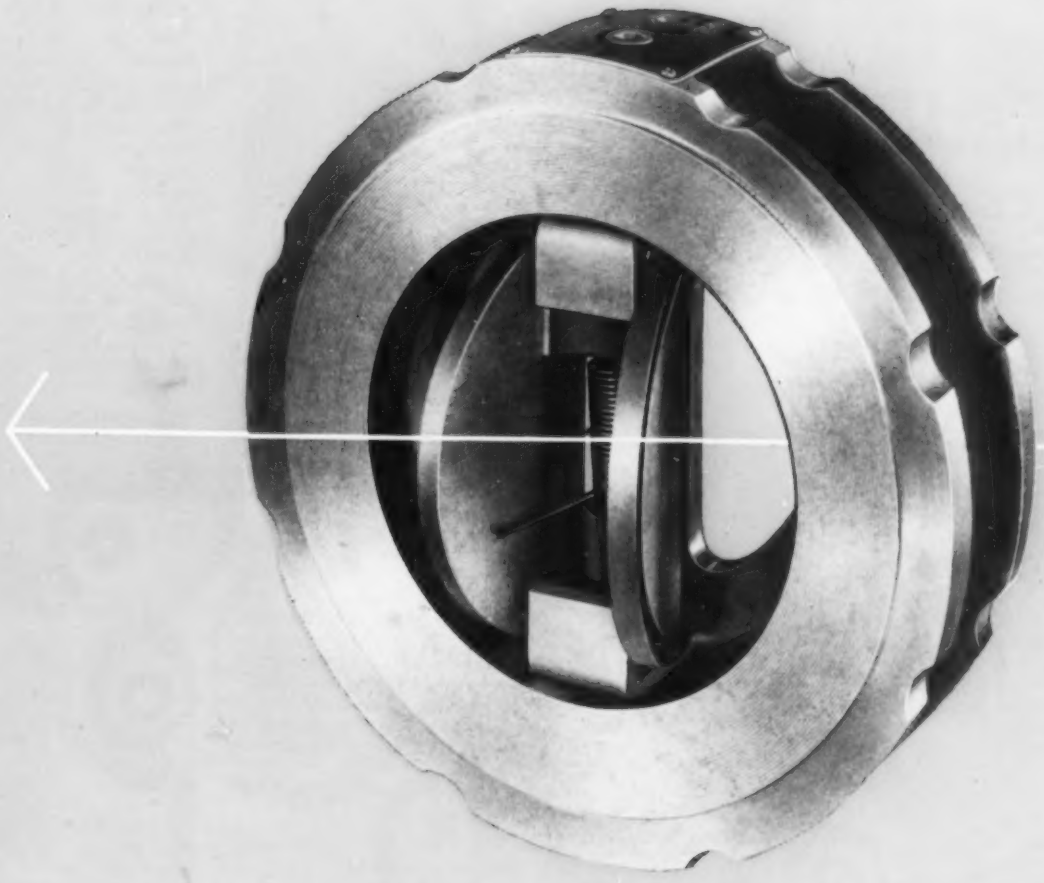
Methane, ethane, propane, etc. can be determined in minutes in parts per million concentrations. The simplified instrument is designed for field use for gas leak detection.

For more data, circle **No. E7** on Readers' Service Card, last page this issue.



fits between the flanges

less space—weighs only 10% as much



Mission Duo-Chek valves

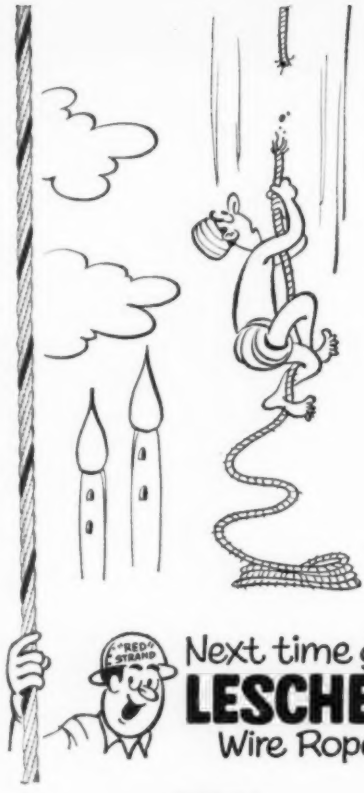
Mission Duo-Chek Valves weigh approximately 10 per cent as much as conventional check valves. Smaller, lighter Duo-Chek Valves mean that you save on space, weight, installation, and price. But, you are getting a check valve with a bubble-tight seal, anti-slam closure, long life built in. No load is carried on the plate hinges. No external parts. No lubrication required.

The sine wave seal prevents seepage, yet holds without leaking or distortion at maximum test pressure. The sealing material is molded and bonded into a metal groove, making an "O"-ring type seal. Pressure deforms the packing. Metal-to-metal contact completely encloses the sealing material, preventing pinching off under pressure. Available in steel, 316 stainless, aluminum, and bronze to fit ASA raised face or ring joint flanges.

MISSION MANUFACTURING CO. P. O. BOX 4209, HOUSTON, TEXAS • CABLE ADDRESS "MISSCO"
EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK • In the United Kingdom: MISSION MANUFACTURING CO., LTD., 1 Hanover Square, London W. 1 England • cable address "MISSOMAN"

MISSION MANUFACTURING CO.

60—189



LESCHEN WIRE PORTER ROPE DIVISION

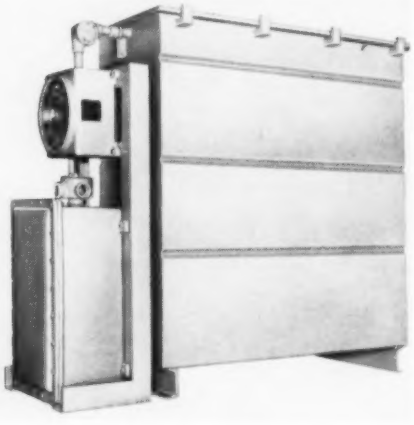
H. K. PORTER COMPANY, INC.

Computer Control System

A computer control system designed for broad use in industrial applications including gas transmission systems, has been introduced by Minneapolis-Honeywell Regulator Company. Honeywell's 290 digital computer, a solid-state device, is the nucleus of the system. For on-line monitoring and control of industrial processes, the high-speed rating of the computer permits frequent system checks and closer control of variables. It also enables computer to do other jobs on a time-sharing basis, and provides future increases in space and complexity of operations.

Both binary and decimal arithmetic are used by the computer. Computer has a vocabulary containing up to 63 single address instructions and a large number of no-address instructions. It features simultaneous measurement, computation and control of process variables, and random selection of inputs and outputs.

For more data, circle **No. E8** on Readers' Service Card, last page this issue.



Cathodic Current Control

An automatic potential control which makes current adjustments in cathodic protection systems has been introduced by Electro Rust-Proofing Corp. As rate of corrosion of underground or submerged structures is affected by deterioration of coatings, temperature and environment changes, etc. adjustments are necessary in current applied. This can be accomplished automatically with Automatic Potential Control.

The control system provides continuous indication of the protective state of the structure, regulation of applied current, retarding of coating deterioration conservation of power and anode material, and prevents overloading of the DC rectifier.

For more data, circle **No. E9** on Readers' Service Card, last page this issue.

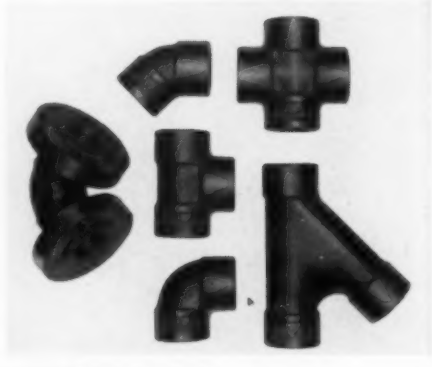
Epoxy Fittings

Conley Plastic Corp., announces availability of its fiber glass reinforced epoxy fittings. Over 430 fittings in sizes from 1-inch through 6-inch are included in the line.

The fittings offer excellent resistance in the transfer of a wide range of corrosively active liquids. They represent over 10 years of research development and field testing under everyday operating conditions.

Conley grades are available up to 1,000 psi working pressure.

For more data, circle **No. E10** on Readers' Service Card, last page this issue.



CATHODIC PROTECTION
Good-All
RECTIFIERS

New "Protecto-Stack"
SILICON RECTIFIERS
NOW
GUARANTEED
for
ONE YEAR
See Your Representative

GOOD-ALL ELECTRIC MFG. CO.
OGALLALA, NEBRASKA

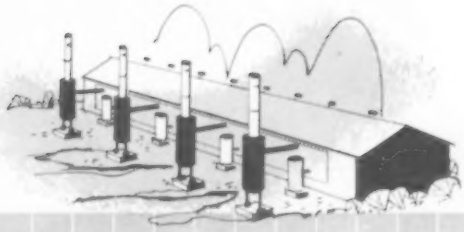
Unit-Type Compressor

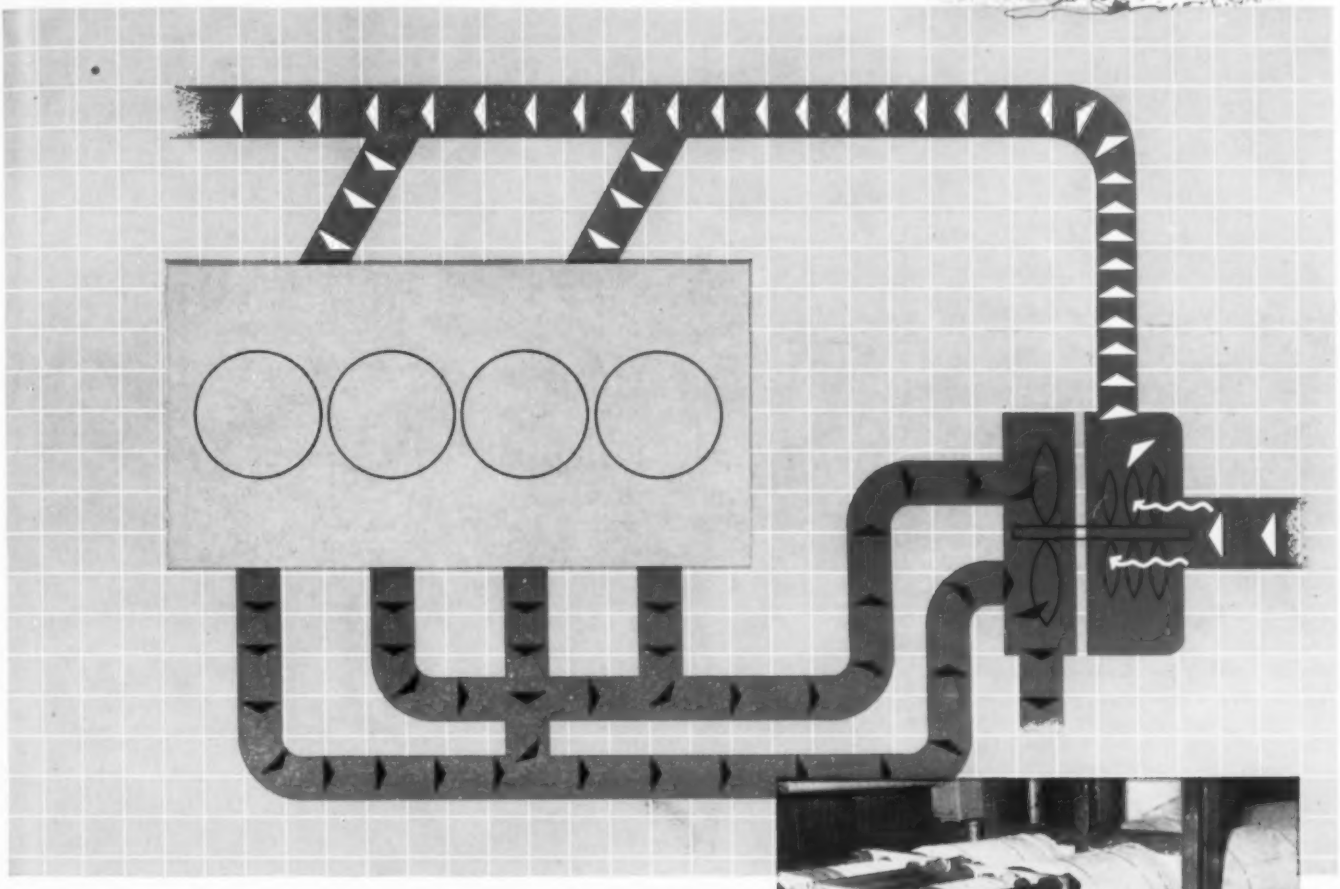
New features have been introduced on Westinghouse unit-type compressor model 5YC. Design changes on the two-stage, two cylinder compressor include unloading system for automatic loadless starting. In addition to allowing the drive motor to reach full speed before compressor begins to pump air, the system provides positive protection against low oil level operation. Rated operating pressures, using a 10 hp drive are 125, 175 and 250 psi. It is also available with a 15 hp drive in 175 model. Unit has constant speed, start-stop or dual control operation.

For more data, circle **No. E11** on Readers' Service Card, last page this issue.

Flexonics

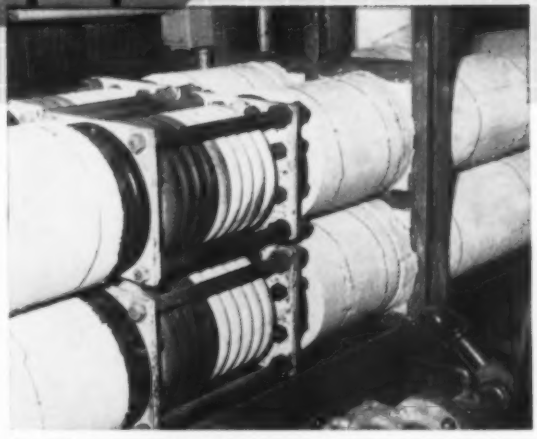
has the engineering experience to help you solve exhaust expansion problems when you turbocharge compressors





Here's a lively subject – *increasing gas pipeline capacity by turbocharging existing compressors in the field.* If you want the answers to the expansion problems that arise when the exhaust piping becomes an integral part of the operating loop, call on FLEXONICS engineers. They have the *specific* experience in this field that can mean actual dollar savings to you.

Write today for your free copy of this easy-to-read report. It tells you the dollars-and-cents facts that led an important pipeline company to a complete turbocharging program.



Special-design FLEXONICS Expansion Joints in the exhaust piping of a newly turbocharged compressor station.

EJMA Member Expansion Joint Manufacturers Association

EJ-250

Flexonics corporation

In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ont.

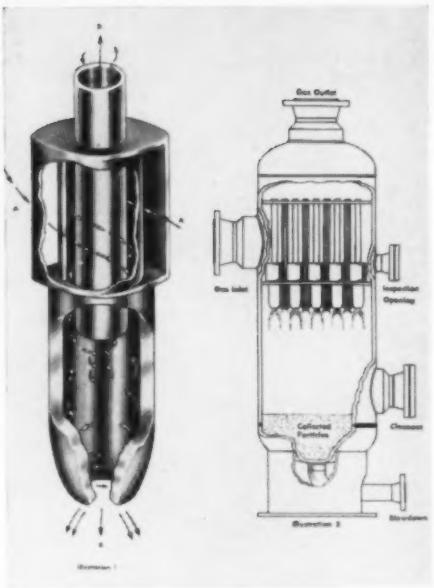
EXPANSION JOINTS · METAL HOSE · SYNTHETIC HOSE · BELLOWS · AERO/SPACE COMPONENTS

SUBSIDIARY OF CALUMET & HECLA, INC.

ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

Flexonics Corporation
1420 S. Third Avenue
Maywood, Illinois

Please send me a copy of Technical Bulletin No. 175, including the detailed report on the engineering and economic aspects of turbocharging existing compressor engines to increase pipeline capacity.



Dry Scrubbers

Dry scrubbers to remove dust and liquid from gas lines have been developed by Peerless Mfg. Company. The scrubber utilizes multiple cyclones to achieve high efficiency removal of troublesome dirt and liquid. These scrubbers are offered in a complete range of sizes and working pressures to fit any scrubber requirement.

The cyclone elements are constructed of alloy combining abrasion and corrosion resistance with shock resistant qualities needed for reciprocating compressor station requirements. Also available are compartmented scrubbers to handle the problems of widely varying flows with only one vessel.

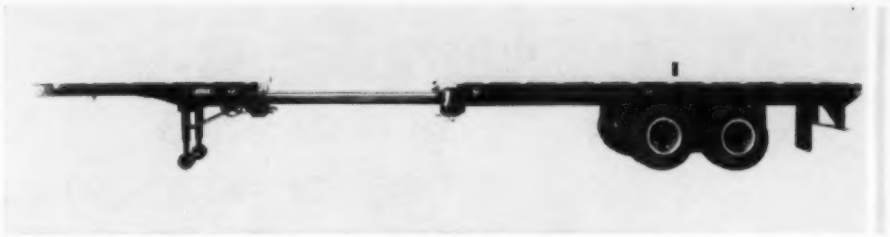
(This item supplements Peerless Manufacturing Co. data on pages 341-344 of the Pipeline Catalog, Second Revision.)

For more data, circle **No. E12** on Readers' Service Card, last page this issue.

Epoxy Insulation of Coils

An epoxy insulating system for electric-motor coils has been introduced by the Crocker-Wheeler Division of Elliott Company. Known as Epa-Seal, the system is applied to both random-wound and form-wound motors of 1 to 5,000 horsepower. Resin is applied to core and frame before winding. Slot cells are epoxy-glass, and coils covered with glass tape, with slot sections protected by epoxy-mica wrapper. This has been tested in underwater operations.

For more data, circle **No. E13** on Readers' Service Card, last page this issue.



Extensible Trailer

A multipurpose extensible trailer combines into one unit and can function as two trailers, a pole trailer or platform trailer. It is easily adjustable to full length pole trailer of 55 feet. Intermediate settings of 5-foot spacings are provided ranging from the basic length of 35 feet to 55 feet.

Extended length is securely and automatically locked into position on steel telescoping tubes. The Atlas Trailer Mfg. Corporation's Extend-Able trailer elimi-

FRANK WHEATLEY
FRANK-FLO CHECK VALVES
WERE USED EXCLUSIVELY
ON THE TRANS-WESTERN
PIPELINE!

TRANS-WESTERN
GOES FRANK WHEATLEY
. . . COMPLETELY!

The Frank Wheatley valves used, ranged from 2" to 30". Larger valves utilized the Slam-Minimizer. See opposite page.

nates dollies and pole attachments and will haul heavy loads.

For more data, circle **No. E14** on Readers' Service Card, last page this issue.

Blending System

An electronic blending system for gasolines, fuels, and lubes which combines advantages of analog and digital computing and telemetering techniques has been announced by B-I-F Industries, Inc.

System includes such features as high resolution read-out of computed formula; direct blending to transport loading or pipe line; and fail safe control of components with "memory" which restores formula to correct value independent of step changes in rate or system pressure.

For more data, circle **No. E15** on Readers' Service Card, last page this issue.

Electric Plants

Pacific Mercury has devoleped new lightweight 1,750, 2,000 and 2,500 watt electric plants. Horsepower has been increased 10 to 15 percent while weight of the generators has been reduced 25 pounds. The electric plants have six receptacles for multiple operation of power tools and other equipment; electric start; hi-lo battery charge on all AC models; rpm indicator; and cast aluminum skids.

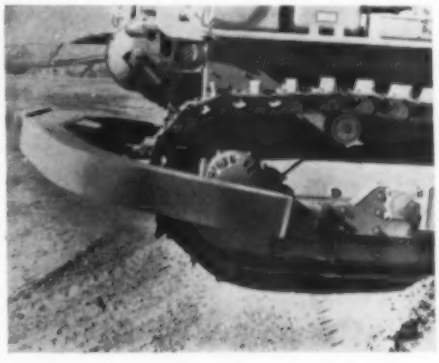
For more data, circle **No. E16** on Readers' Service Card, last page this issue.

PD Meters

The new 120-gpm positive displacement Brodie BiRotor Meters Models B54 and B55 have been announced by Ralph N. Brodie Company. Designed to handle crude and products they are particularly suitable for use on small pipe lines, LACT units and similar applications. Both high pressure meters feature Brodie's double case construction.

Working pressure of the B54 is 600 psi, while the B55 working pressure is 1,200 psi. Flanged inlet and outlet connections are in line on both models.

For more data, circle **No. E17** on Readers' Service Card, last page this issue.



Pushloading Tractors

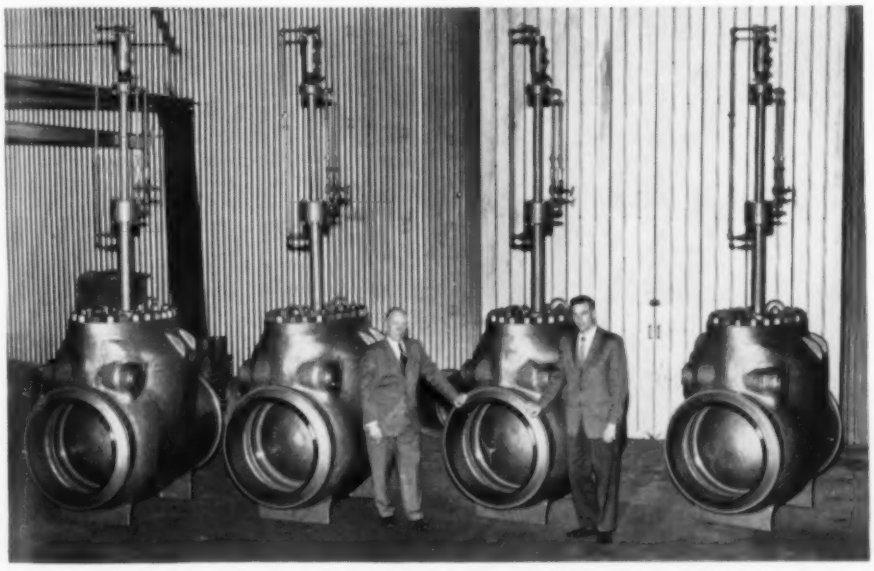
Developed to speed pushloading production and reduce pit cycle time, Caterpillar Tractor Co. announces three pushloading attachments for tractors.

The No. 9C cushion-dozer and case-mounted cushion push block permit approach and contact of push tractors at relative speeds up to three miles per hour. A rear mounted tandem pusher C-frame is designed for use on tractors equipped with dozer blades.

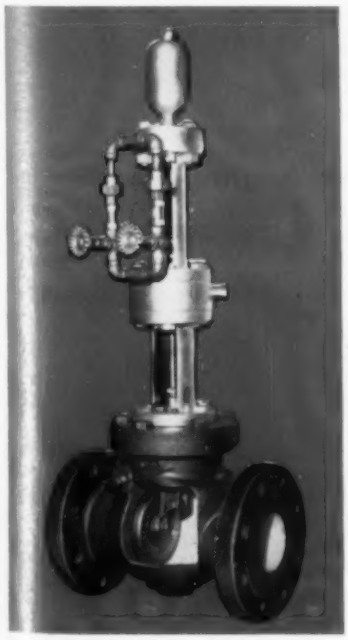
The cushion dozer and cushion push block are constructed to absorb shock of push-tractor contact with scrapers at these higher than normal speeds. Production can be increased by making contact at these higher speeds.

For more data, circle **No. E18** on Readers' Service Card, last page this issue.

AT LAST...
SLAM ELIMINATED!



Every major high pressure gas line under construction today will utilize Frank Wheatley's new Slam-Minimizer Check Valve. Above: a partial order of 30" Slam-Minimizer Check Valves ready for shipment to the Transwestern Pipeline project.



High pressure gas line maintenance and replacement savings in thousands of dollars are now possible through the use of Frank Wheatley's new Slam-Minimizer Check Valve. When installed and adjusted the Slam-Minimizer completely eliminates clapper slam and flutter. A unique hydraulic system governs the upward and downward movement of a piston linked to the clapper. The result — a smooth, quiet opening and closing under the most drastic mainline pressure changes.

NEW! Now you can convert your present Frank Wheatley Check Valves with a Slam-Minimizer Adaptor Kit. Low cost and easy installation makes it completely practical.

SINCE 1916

FRANK WHEATLEY PUMPS & VALVES TULSA, OKLAHOMA

Complete details available upon your written request.

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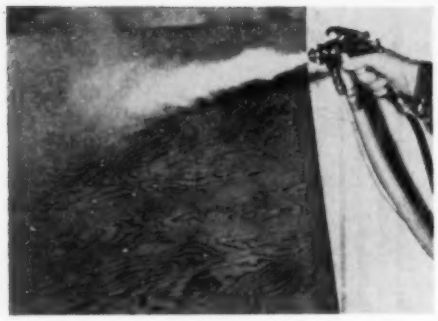
LU 4-5175

YOUR SUPPLY STORE SHOULD HAVE THEM!

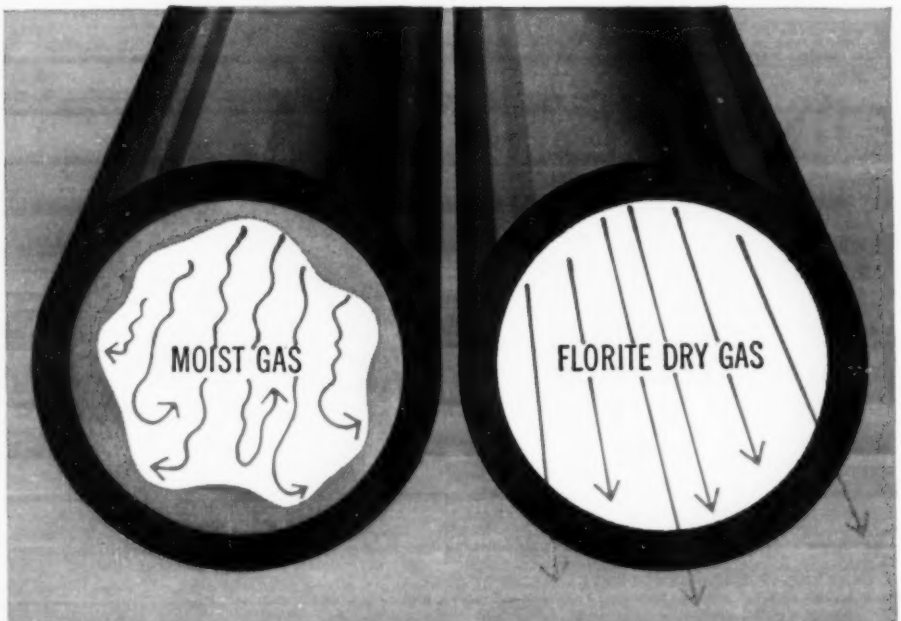


Fiberglas Flake Coating

A spray coating providing a corrosion-resistant surface to metals, wood and concrete has been introduced by Owens-Corning Fiberglas Corporation. A spray gun unit for applying the new coating has been developed by De Vilbiss Company of Toledo, Ohio. A homogeneous mixture of Fiberglas Flake, resin, fillers, accelerator and pigment (if desired), the coating can be utilized in many fields where corrosion is a major problem, such as storage tanks, jackets for industrial stack insulation and concrete pipe etc. Also it can be used as an internal coating for oil tanker bunkers.

Spray gun assembly consists of pump, spray gun, air compressor, five-gallon pressure tank, air regulator, flow meter, and air and fluid hoses.

For more data, circle **No. E19** on Readers' Service Card, last page this issue.



Avoid Costly Pressure Drop
Dry Your Gas With FLORITE®

During cold spells, gas and water vapor tend to form ice-like hydrates on the inside walls of pipeline and instrumentation equipment. These deposits cause turbulent gas flow which leads to pressure drop and the headaches, lost time and money it entails.

Dehydration of your gas with granular FLORITE Desiccant lowers its water content well below normal pipeline specifications. Hydrate deposits cannot form.

FLORITE can absorb 20% of its weight in water and is easily regenerated in place by heating to 350°F. It won't swell or disintegrate in water and FLORITE offers no source of contamination or corrosion.

More information about quality FLORITE Desiccant and how it can save you from such troubles as rusting, freezing and fogging will be gladly furnished upon request.

FLORIDIN COMPANY

Fuller's Earth • Activated Bauxite • Synthetic Adsorbents

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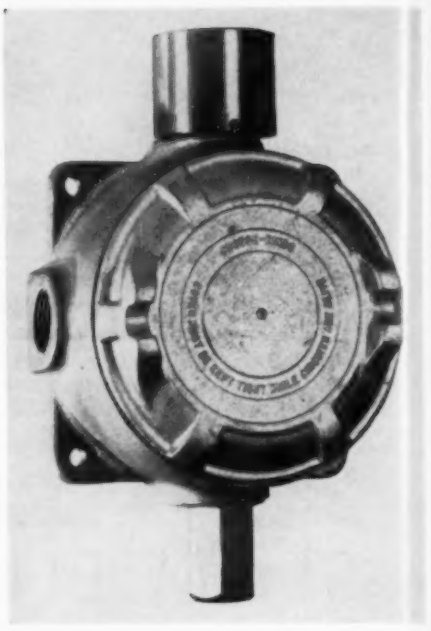
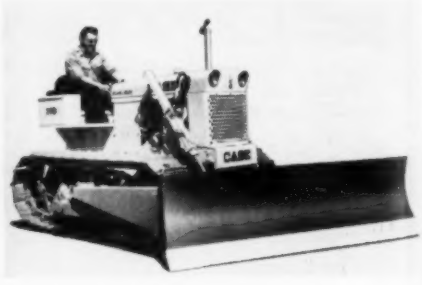


Dual Switch

A new dual switch, explosion-proof pressure control, developed especially for pipe lines, is offered by United Electric Controls Co. Two completely separate switches permit control of two independent circuits to simulate double pole circuitry. The calibrated adjustment is protected by a tamper proof cap and pressure settings may be locked to avoid unauthorized tampering.

The H98A controls can be used to detect leaking oil seals in the pumps. The controls sense an increase in pressure, when leak occurs, and send a signal to a central station often thousands of miles away.

For more data, circle **No. E20** on Readers' Service Card, last page this issue.



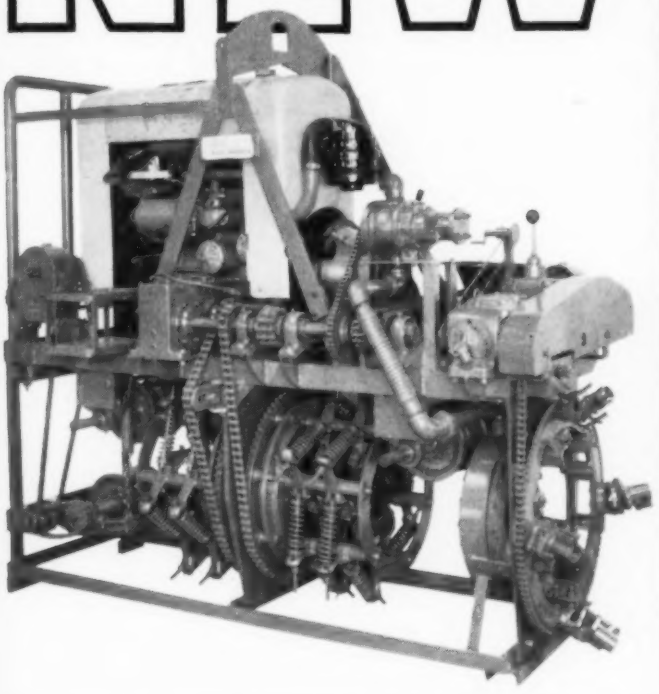
Power Angling Dozer

Hydraulic-powered blades are now offered on the 42-hp Case Model 310 utility crawlers. J. I. Case Co. has used the blades on larger models. The new 310 allows operator to angle blade 25 degrees left or right without having to stop the tractor. Two double-acting hydraulic cylinders power the angle blade.

The crawler unit is designed especially for road crowning, ditching, digging out trees, breaking up hard pan and maintenance level grades in rough terrain. The tractor develops 29.07 drawbar horsepower and delivers up to 5,815 pounds pull and push. Shuttle-shift transmission, 11-inch ferrometallic clutch and leaf-spring suspension are features of the 310.

For more data, circle **No. E21** on Readers' Service Card, last page this issue.

NEW



CROSE COMBINATION CLEANING & TAPE WRAPPING MACHINE

AVAILABLE IN FOUR MODELS

The New Crose Combination Cleaning and Tape Wrapping Machine has variable speed tape wrapping head; built-on blower to remove dust from pipe prior to applying tape, and baffles incorporated into machine's design to protect wrapping area from dust. Four models — comparable to the Crose Cleaning and Priming Machine — handle these pipe sizes: 2″-4″; 4″-16″; 16″-32″ and 34″-40″.

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New Equipment Literature

For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers' Index. Simply circle code numbers of items desired—sign and mail card.

Valve Line

R-P&C Valve Division, American Chain & Cable Company, Inc., has issued a catalog containing operating specifications, characteristics, sizes, ratings and illustrations of its complete line of valves.

The 16-page catalog includes descriptions of the manufacturer's line of bronze, iron and forged steel gate valves, bronze and iron globe and angle valves, bronze and iron check valves, cast steel valves, and other lines.

For more data, circle **No. E22** on Readers' Service Card, last page this issue.

Computerese?

Did you think a drum was something you beat on? Or that a bit was something to stick in horse's mouth? Or that a patch pertained to mending clothes? If you did then you don't speak Computerese. But, if you speak Computeres, you know a drum is a rotating cylinder used to store information in machine language; a bit is short for binary digit and a patch means a section of coding.

These and other computer terms are defined in a booklet, Do You Talk Computeres, published by Minneapolis-Honeywell Regulator Company. It included some 82 terms which the instrument producer's engineers have helped to create building industrial process computers.

For more data, circle **No. E23** on Readers' Service Card, last page this issue.

Pneumatic Controls

The Bristol Company announces availability of a bulletin describing its new Series 624 indicating pneumatic controllers. The new A/D control unit is featured, specifications for the instrument are given, and models are listed for controlling pressure, vacuum, liquid level, flow, temperature, and humidity.

For more data, circle **No. E24** on Readers' Service Card, last page this issue.

One-Coat Coating

A 2-page bulletin on use of Prufcoat Primastic one-coat painting is available from Prufcoat Laboratories, Inc. The fibrated epoxy mastic combines rust inhibitive primer properties with both organic and inorganic chemical resistance. It is designed to make one-coat process possible for equipment in marine, petroleum and chemical industries.

For more data, circle **No. E25** on Readers' Service Card, last page this issue.

Indicating Liquids

A catalog describing the line of seven color-coded indicating liquids for manometers and hydrostatic gages has been issued by King Engineer Corp.

The liquids range in specific gravity from 0.824 to 13.546 at 68° F, giving a wide choice of instrument sensitivity and range. The gravity of each liquid is held constant, and remains constant, to the third decimal. Colors used are orange, blue, green, purple, brown, red and silver. Physical properties and composition of each liquid are given in the catalog.

For more data, circle **No. E26** on Readers' Service Card, last page this issue.

Tractor Shovels

Covering the two largest capacity Michigan tractor shovels, a four-color bulletin has been issued by Construction Machinery Division of Clark Equipment Company.

The tractors described are designed for heavy duty digging and loading jobs, and for operation where high materials handling output is necessary. Complete specifications of both machines are given, along with information and illustrations on application of the tractor shovel.

For more data, circle **No. E27** on Readers' Service Card, last page this issue.

Steel Line Pipe

An eight-page brochure which outlines specifications and other facts about line pipe has been issued by The Youngstown Sheet and Tube Company.

The bulletin includes graphic description of the three methods by which the company makes line pipe—continuous weld, seamless and electric weld.

For more data, circle **No. E28** on Readers' Service Card, last page this issue.

Instruments and Controls

Instruments, Inc., has published a 12-page catalog on its industrial instruments and controls. A wide selection of liquid and granular solid level controls is illustrated in the catalog.

Among the items featured are the B-07 transistorized Electro-O-Probe level control and the Mic-O-Float level switches.

For more data, circle **No. E29** on Readers' Service Card, last page this issue.

Welding Current Leaks

A four-page bulletin on causes and cures for hot running welding cables and connections has been released by Tweco Products, Inc.

The bulletin includes information on how to maintain welding equipment and electrical connections. An efficient cool-running welding circuit is provided with ample size cables tightly connected throughout. Only one bad connection can cause a hot-running and inefficient circuit.

For more data, circle **No. E30** on Readers' Service Card, last page this issue.

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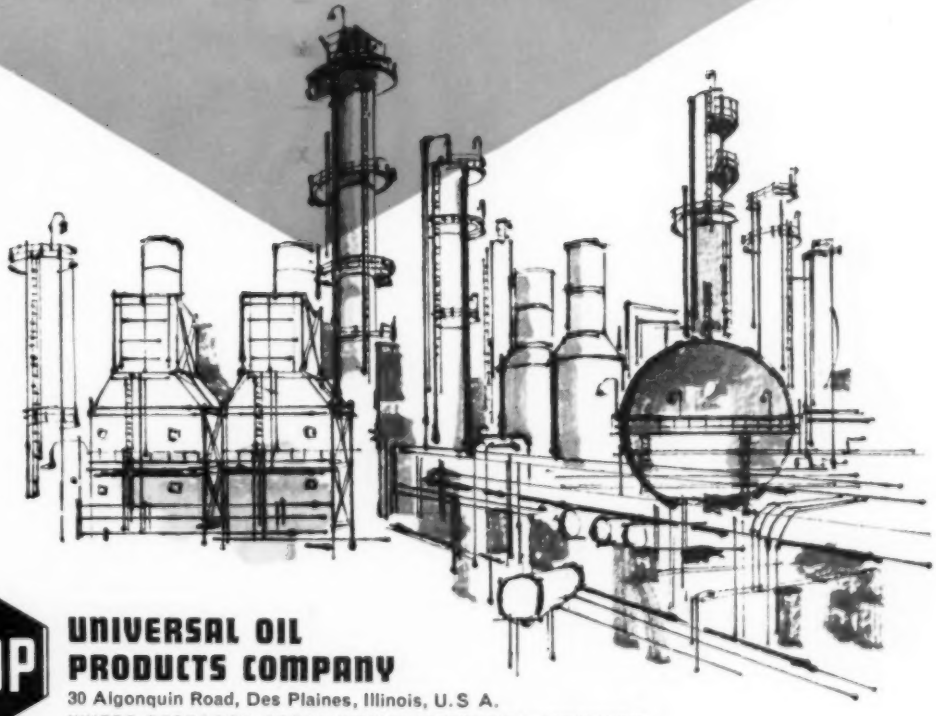

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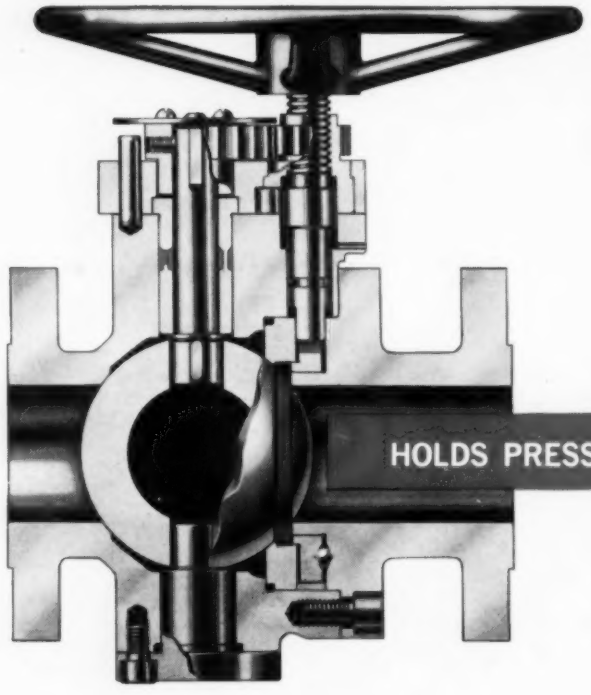

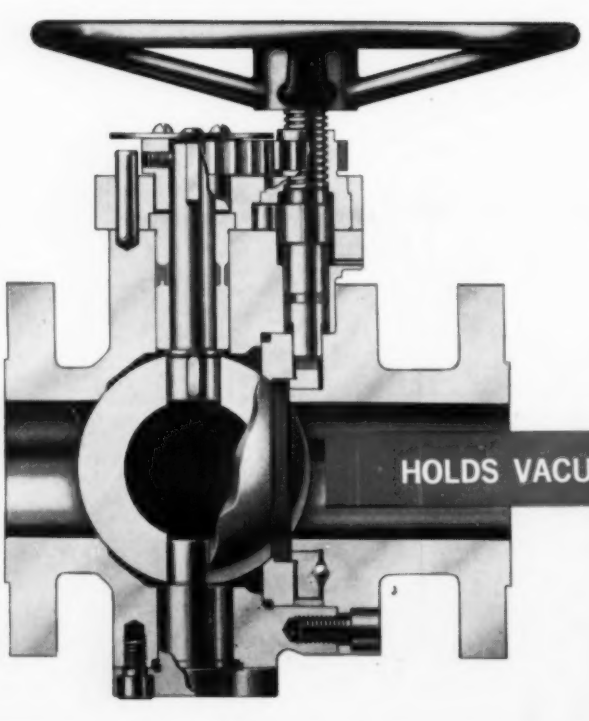

HYDRIL BALL Type "K" PLUG VALVES

Controlled sealing . . . a new concept in valve design . . . is the secret of Hydril's tight, bubble-proof shutoff. Hydril Ball-Plug Valves always seal positively against pressure from either direction—or against vacuum—because the fully confined packing ring is mechanically compressed between plug and seat when the valve is closed. This tightly compressed gasket type seal easily bridges clearances between parts as well as surface imperfections. Result: seal efficiency is unimpaired by prolonged hard usage, by rust or sediment.

Design of Hydril Type "K" Ball Plug Valves assures minimum maintenance costs. Non-lubricated, they employ no sealing lubricants. There's no sliding friction between plug and body to produce wear and abrasion.

The spherical plug is mounted on accurately positioned bearings, maintaining a minimal controlled clearance between plug and body. This contributes to easy, free-turning operation as well as to long service life.

●

Hydril valves are available in a wide range of sizes and ratings. Worm-gear and motor-operated models can be supplied. Get the full story on Hydril Valves from your nearby representative . . . or write Hydril Company for free Catalog No. V-60.

HYDRIL COMPANY

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